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OCTOBER, 1956

RUBBER WORLD

Contents, page 65

NOW IN ITS 68th YEAR

FUSION AND ADHERENCE OF NATURAL RUBBER DURING SHIPMENT

By T. E. Williams, page 79

A BILL BROTHERS PUBLICATION

Don't Lose Accelerator Activity During Bin Storage

The properties of uncured stocks often change during bin storage. They may set up, pre-cure, or lose accelerator activity and fail to cure tightly later. However, with proper choice of accelerators, it is possible to prepare stocks which remain stable and process properly even after long storage.

Camelback, which often stays in bin storage for relatively long periods of time, must neither pre-cure nor lose accelerator activity. For such stocks, usually made with GR-S, there is no better acceleration than

Thionex-MBTS

Camelback stocks containing these accelerators are...

- **Safe processing**
- **Do not pre-cure**
- **Retain full accelerator activity**
- **Very economical in accelerator cost**

See BL-282 "Thionex-MBTS Acceleration of GR-S Camelback"

E. I. du Pont de Nemours & Co. (Inc.)
Elastomers Division
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RUBBER CHEMICALS

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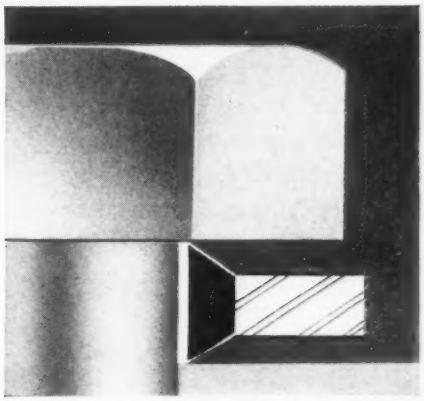
BETTER THINGS FOR BETTER LIVING ... *THROUGH CHEMISTRY*

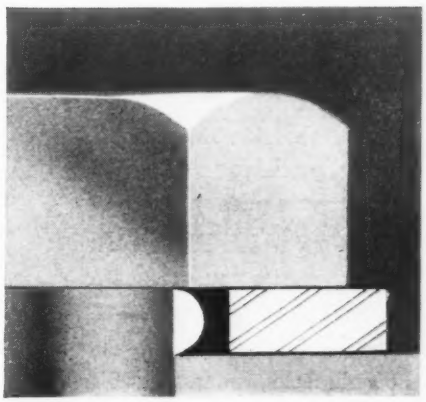
RUBBER WORLD, October, 1956, Vol. 135, No. 1. Published monthly by BILL BROTHERS PUBLISHING CORP. Office of Publication, 1309 Noble Street, Philadelphia, Pa., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U.S.A. Entered as Second Class Matter at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription United States $5.00 per year; Canada $6.00. All other countries $7.00. Single Copies 50 cents. Address Mail to N. Y. Office.

Another new development using

B.F.Goodrich Chemical *raw materials*



Seal before compression



When bolt is tightened, sealing lips are forced against surface.

Hycar rubber bonded to steel solves sealing problems

FACED by a sealing problem with water, gases, chemicals, petroleum products or other fluids? Then listen to this:—

The Precision Rubber Products Corporation of Dayton, Ohio, has come up with a one-piece seal using Hycar nitrile rubber that gives positive sealing action against constant or pulsating pressures up to 10,000 psi!

The Hycar is heat and pressure-bonded to a steel washer to become the sealing member. When compressed, it supplies lock washer action and reduces bolt torque. Under any type of flange, bolt or screw, it gives leak-proof sealing. What's more, it eliminates costly groove cutting or machining of surfaces.

Hycar was specified for this new product because it keeps its shape, strength and flexibility . . . is far superior to general purpose rubber in resistance to oxidation and aging. And it has exceptional resistance to the deteriorating properties of a wide range of fluids and gases, temperatures and pressures.

Throughout industry, Hycar's remarkable qualities are improving existing products or are providing the inspiration to create new products. For complete information on how one of the Hycar rubbers can do this for you, too, write Dept. ES-10, B. F. Goodrich Chemical Company, 3135 Euclid Ave., Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Hycar
American Rubber

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

B.F.Goodrich **GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors**

PHILBLACK* makes rubber do tricks for you!

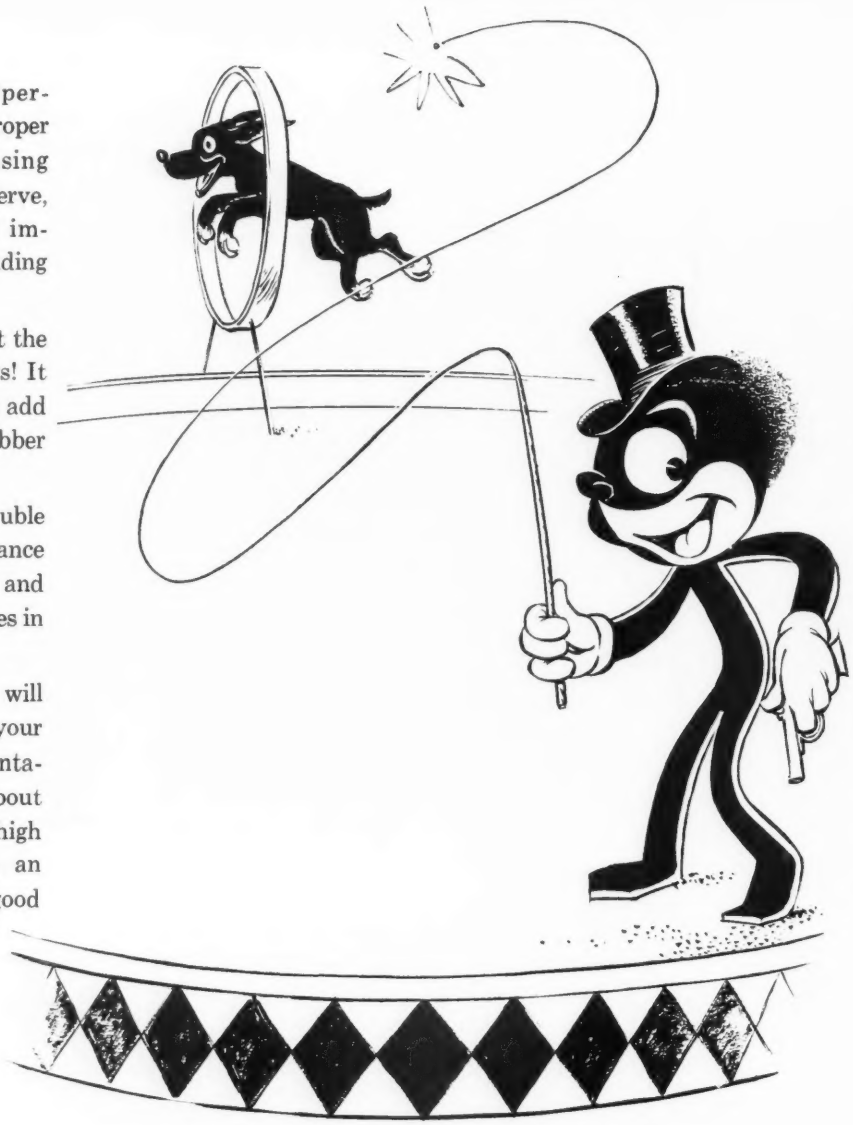
Your rubber compound "performs" better with the proper Philblack. For example, using Philblack A helps remove nerve, speeds up processing, and improves the molding and extruding qualities of rubber.

And in the finished product the Philblacks are star performers! It is no trick for Philblack E to add much more wear to cold rubber tire treads.

And Philblack I plays a double role. It maintains a good balance between abrasion resistance and costs . . . producing sturdy tires in the moderate price range.

To learn which Philblack will perform best for you, consult your Philblack technical representative. Get full information about the Philblacks, the family of high quality carbon blacks with an international reputation for good performance!

*A trademark



Meet the Philblacks! DISCOVER WHAT THEY'LL DO FOR YOU!

Philblack A FEF Fast Extrusion Furnace Black
Ideal for smooth tubing, accurate molding, satiny finish. Mixes easily. High, hot tensile. Disperses heat. Non-staining.

Philblack I ISAF Intermediate Super Abrasion Furnace Black
Superior abrasion resistance at moderate cost. Very high resistance to cuts and cracks. More tread miles at high speeds.

Philblack O HAF High Abrasion Furnace Black
For long, durable life. Good electrical conductivity. Excellent flex. Fine dispersion.

Philblack E SAF Super Abrasion Furnace Black
Toughest black on the market. Extreme abrasion resistance. Withstands aging, cracking, cutting and chipping.

PHILLIPS CHEMICAL COMPANY, Rubber Chemicals Division, 318 Water St., Akron 8, Ohio. Export Sales: 80 Broadway, New York 5, N. Y.
West Coast: Harwick Standard Chemical Company, Los Angeles, California.

Naugatuck's B-L-E Antioxidant

Protects Brand Reputations, too!

A reputation for building tires or mechanical rubber goods that *last* can be your biggest asset! And there's no better way to protect it—or your products—than by using Naugatuck's B-L-E, *the universal antioxidant and stabilizer* for all natural and synthetic rubbers!

B-L-E provides outstanding protection against flex-cracking and the degradation caused by heat and oxygen. It prevents breakdown of rubber products at temperature extremes by preventing the elastomer from becoming either too brittle or too soft.

A free-flowing liquid, B-L-E disperses quickly and easily in rubber compounds and is very effective at *low concentrations.* Two parts per 100 RHC gives maximum flex-cracking resistance. Proved—and constantly improved—during the past 25 years, B-L-E provides the finest anti-aging qualities in rubber products where discoloration is not a factor. Why not let it protect the reputation of *your* brand of rubber products?

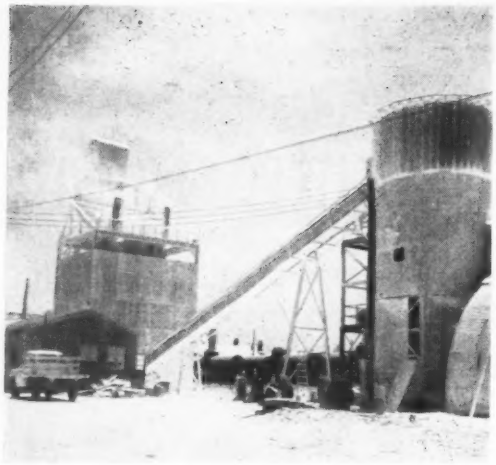
In polymer plants, B-L-E®, added as an emulsion to RS latex, is retained in the polymer during and after flocculation and drying to protect it against resinification and subsequent heat and oxidative deterioration.

Naugatuck Chemical

Division of United States Rubber Company
Naugatuck, Connecticut

US RUBBER

IN CANADA: NAUGATUCK CHEMICALS DIVISION • Dominion Rubber Company, Limited, Elmira, Ontario
RUBBER CHEMICALS • SYNTHETIC RUBBER • PLASTICS • AGRICULTURAL CHEMICALS • RECLAIMED RUBBER • LATICES • Cable Address: Rubexport, N.Y.



BURGESS COMPOUNDING MATERIALS

for Rubber and Synthetic Resin Compounds

USE BURGESS "ICEBERG" PIGMENT

- **For Vinyl Extrusion and Vinyl Floor Covering Compounds** "Iceberg" provides excellent base color as a white mineral loading, excellent resistance to alkalis and acids, high specific resistance with low moisture absorption properties.
- **For Butyl Wire and Insulating Compounds** "Iceberg" possesses excellent processing, reinforcing, and good electrical properties.
- **For Colored Butyl Inner Tubes, Drug Sundries and Mechanical Goods** "Iceberg" possesses excellent color, processing and curing properties and low moisture absorption.
- **For GR-S Compounding** "Iceberg" is useful in compounds requiring good white filler with good processing properties.

USE BURGESS "ICECAP K" PIGMENT

- When finer particle size and reduced screen residue is desirable **"Icecap K" will give superior results.**

USE BURGESS "PIGMENT NO. 30"

- **For Vinyl Insulating and Electrical Compounds** No. 30 possesses excellent color and yields high insulation resistance values.

USE BURGESS "PIGMENT NO. 20"

- **For Natural and Synthetic Rubber Compounds** No. 20 yields level cures because of controlled pH. In natural rubber a small amount of "Iceberg" (approximately 20% of the filler content) will help prevent stickiness on the mill and also prevents die-plating of extrusion compounds.
- **For Rubber Footwear Compounds** No. 20 possesses excellent reinforcing characteristics and good color.

Write for technical data, working samples, and prices.

Burgess Pigment COMPANY

Mines and Plants: Sandersville, Georgia

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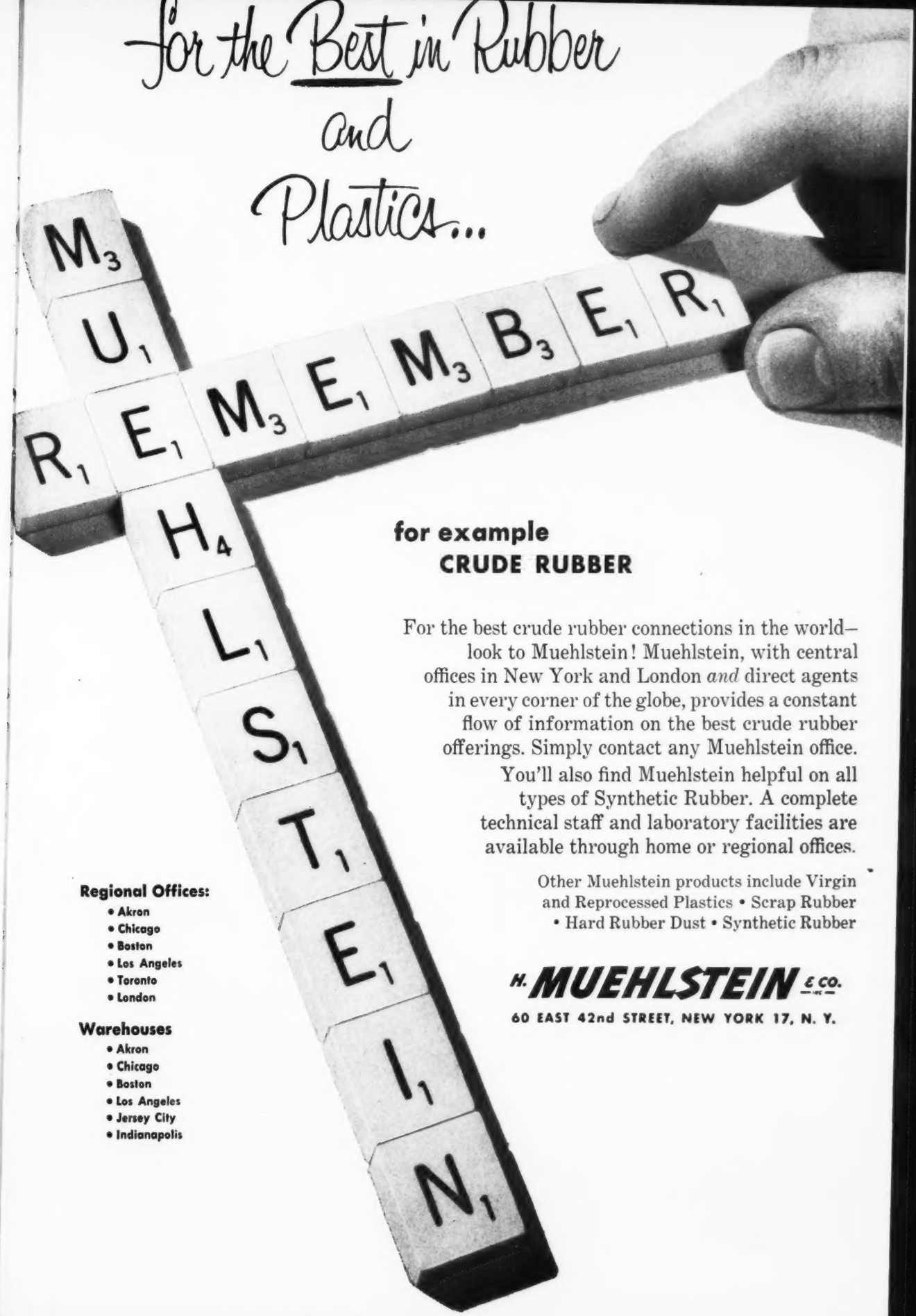
Warehouses: Jersey City & Trenton, N. J.; Saylesville, R. I.

- **HYDROUS AND ANHYDROUS ALUMINUM SILICATE PIGMENTS**
- **KAOLIN CLAYS**

For the Best in Rubber and Plastics...



for example
CRUDE RUBBER

For the best crude rubber connections in the world—look to Muehlstein! Muehlstein, with central offices in New York and London *and* direct agents in every corner of the globe, provides a constant flow of information on the best crude rubber offerings. Simply contact any Muehlstein office.

You'll also find Muehlstein helpful on all types of Synthetic Rubber. A complete technical staff and laboratory facilities are available through home or regional offices.

Other Muehlstein products include Virgin and Reprocessed Plastics • Scrap Rubber • Hard Rubber Dust • Synthetic Rubber

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- Chicago
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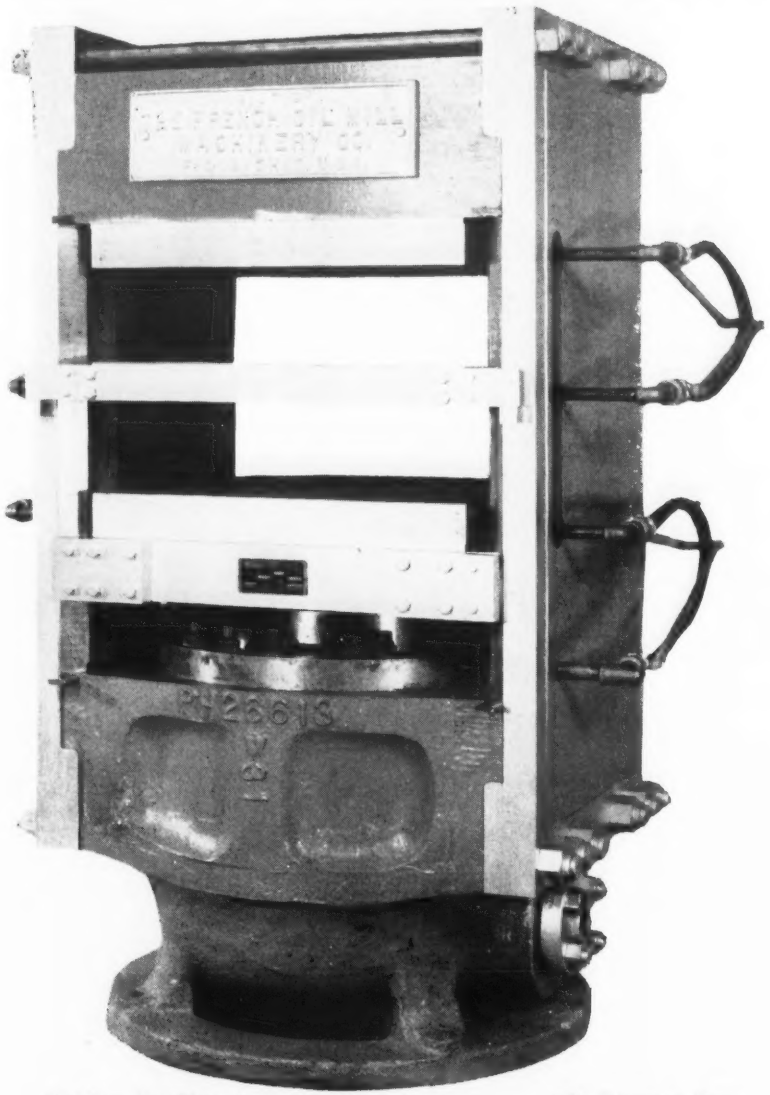

314-Ton Hot-Plate Press
24" x 24" Pressing Surface
20" Diameter Ram.

FRENCH

SIDE-PLATE PRESSES

The finest rubber molding press in the world. French patented features give this press unmatched rigidity and accuracy, as attested to by our growing list of satisfied users. Available in many standard sizes, we invite you to investigate its superiority by consulting with one of our experienced engineers.

- √ **Improve close tolerance molding**
- √ **Reduce maintenance**
- √ **Cut down on rejects**
- √ **Increase production**

WRITE FOR ILLUSTRATED CATALOG

THE FRENCH OIL MILL MACHINERY CO.
(HYDRAULIC PRESS DIVISION)
1011 GREENE ST. PIQUA, OHIO

PELLETED PROTOX ZINC OXIDES
Cut Dusting and Bag Loss

This simple test may surprise you:

Pour out a bag of non-pelleted zinc oxide and one of a Pelleted Protox. You will readily see the savings you can make through less dusting and less sticking to the bags by Pelleted Protox.

Some manufacturers report savings of about $20 per car due to less sticking of Pelleted Protox zinc oxides, plus additional savings from less dusting.

You will also find the following impressive savings from the low dry bulking of Pelleted Protox zinc oxides:

- **Lower unloading costs**
- **Lower intra-plant handling costs**
- **Less storage space**
- **Greater Banbury output**
- **Lower power consumption**

NON-PELLETED ZINC OXIDE

Zinc oxides in powder form tend to stick to the inside of the bags (above). Also they dust more than corresponding pelleted oxides.

PELLETED PROTOX ZINC OXIDE

This type of oxide makes possible significant dollar savings. It minimizes both sticking in the bags and dusting.

THE NEW JERSEY ZINC COMPANY

Producers of Horse Head Pigments
. . . the most complete line of white pigments—
Titanium Dioxides and Zinc Oxides

160 Front Street, New York 38, N. Y.

HORSE HEAD PRODUCTS

Looking for a New Way or a New Kind of Machine?

● **There are several ways to reduce processing costs** . . . combine some of your operations; eliminate the dollars frozen by material-in-process inventory; develop as much of a continuous operation as possible; or cut down on rejects and scrap.

These are big assignments. We know, because we make our living doing just that for manufacturers and processors of rubber and plastic.

We specialize only on rubber and plastic operations . . . no others. Naturally, all of our personnel are rubber and plastic specialists. We understand yields; how much it should cost to make a product; and what kind of equipment you need.

We build special machinery for special jobs. We continually design and build machines which have never been designed or built before. If you want a plan for improving your manufacturing costs, write us. Doing things differently for a profit — yours and ours — is our business.

Improving Costs of Manufacturing is Our Business

Sales and Engineering by

HALE and KULLGREN, INC.

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MANUFACTURE

THE AETNA-STANDARD ENGINEERING CO., PITTSBURGH

PLANTS IN WARREN, OHIO · ELLWOOD CITY

MR. CLIMCO SAYS . . . .

CLIMCO LINERS

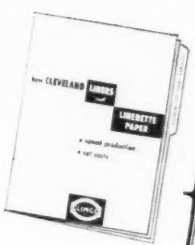
save time at the bias cutter and cutting table

Perfect separation of stock and liner is all important during these operations—for stock adhesions at either point cause expensive down time. You can avoid such production headaches by using Climco Processed Liners that can be readily peeled from the stock without sticking.

Climco Processing of your liners assures many other profitable advantages: Liner life is greatly increased, tackiness of the stock is preserved, and gauges are more easily maintained. Latitude in compounding is enlarged, lint and ravelings are eliminated and horizontal storage is facilitated.

Since 1922 Climco Processed Liners have proved their worth to the rubber industry. Give them a trial in your plant.

THE CLEVELAND LINER & MFG. CO.
5508 Maurice Ave. • Cleveland 27, Ohio, U.S.A.
Cable Address: "BLUELINER"



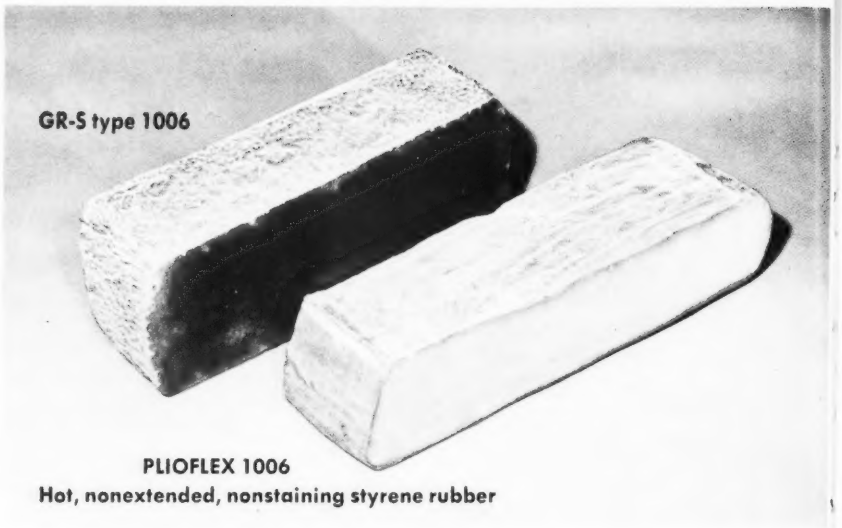
ILLUSTRATED LINER BOOKLET

Tells all about Climco Liners and Linerette and how to get better service from liners. Write for your copy now.

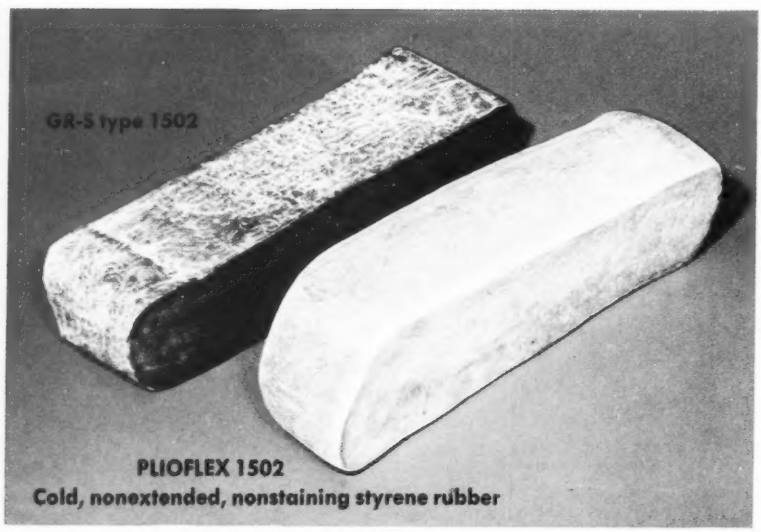
LINERETTE INTERLEAVING PAPER
Treatment Contains
NO OIL OR WAX
Samples on Request

CLIMCO
PROCESSED LINERS

Serving the Industry Since 1921

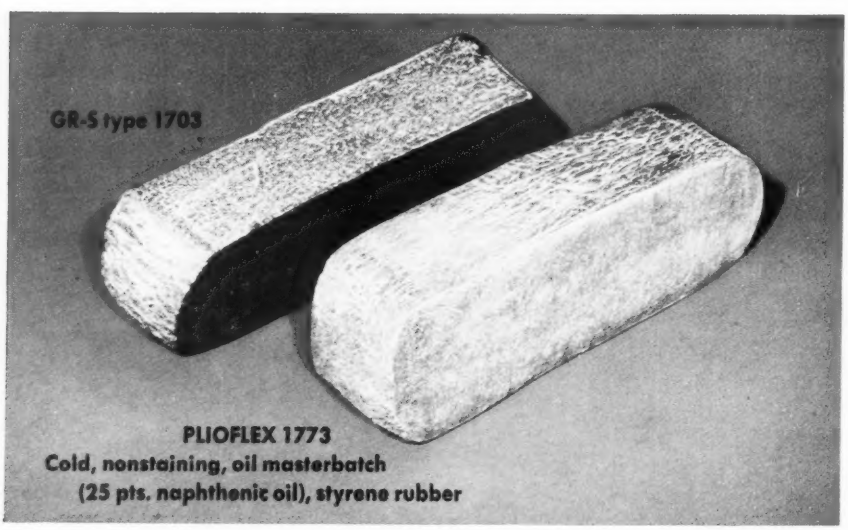


PLIOFLEX 1006
Hot, nonextended, nonstaining styrene rubber

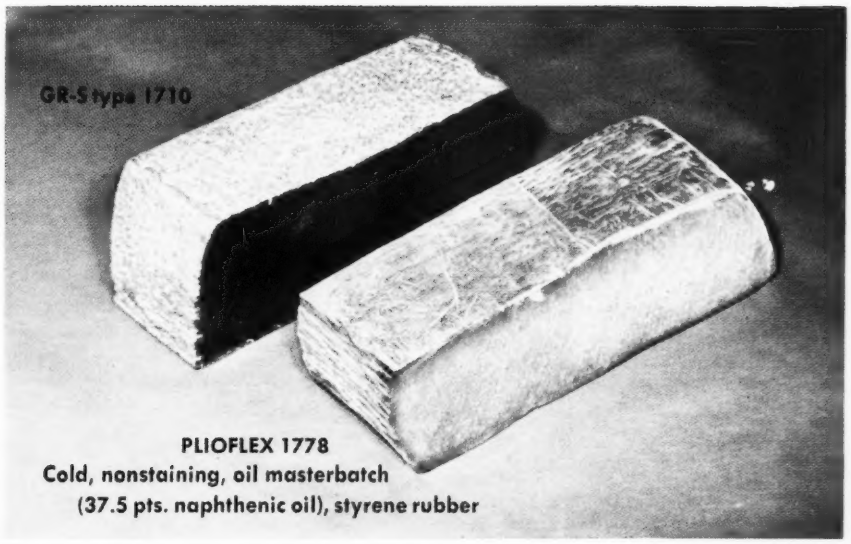


PLIOFLEX 1502
Cold, nonextended, nonstaining styrene rubber

How many



PLIOFLEX 1773
Cold, nonstaining, oil masterbatch
(25 pts. naphthenic oil), styrene rubber



PLIOFLEX 1778
Cold, nonstaining, oil masterbatch (37.5 pts. naphthenic oil), styrene rubber

new products here for you?

Pictured on these pages are unretouched photographs of various styrene-butadiene rubbers, those formerly designated as GR-S in contrast with corresponding PLIOFLEX rubbers now produced by Goodyear. They quickly tell the story of improvements made in both raw materials and manufacturing techniques to bring you the best, most complete line of nonstaining, non-discoloring rubbers ever to be offered.

But these pictures should do more than tell of past accomplishments. What about the present and the future? What thoughts do they bring to your mind about improving present products with PLIOFLEX? How many totally new products do they start you thinking about?

Probably the most significant feature of the new PLIOFLEX line lies in its ability to meet fully the demands of color-conscious consumers and to do it over a wide range of physical properties and cost. This is particularly true since the new light color of PLIOFLEX, in both nonextended and oil-extended types, combines excellent physical properties and processing characteristics at minimum cost.

In other words, with PLIOFLEX you can now compete for markets demanding critical color specifications—markets never before open to synthetic rubber.

Learn more about the new, light color of PLIOFLEX, and discover how it can help you to new or improved products. Why not write, right now, for the full story, including the latest *Tech Book Bulletins*, to: Goodyear, Chemical Division, Akron 16, Ohio.

CHEMICAL
GOODYEAR
DIVISION
RUBBER & RUBBER CHEMICALS DEPARTMENT

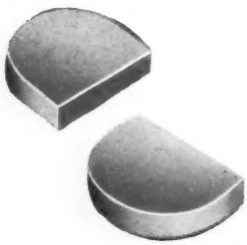
Plioflex
general purpose styrene rubber

PLIO-TUF • PLIOVIC • WING-CHEMICALS
Related Chemicals for the Process Industries

Chemigum, Plioflex, Pliolite, Plio-Tuf, Pliovic –
T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

For top lifts that hold their shape under heat and load...

DUREZ *thermosetting resins*



You can get outstanding advantages, both in processing and end-product benefits, with Durez phenolic resins especially designed for compounded stocks or solvent-type adhesives. The familiar top lift of GRS rubber is a typical example.

During processing, resins formulated for GRS serve as effective plasticizers. But these Durez resins have no thermoplasticity after cure and thus serve to prevent both cold flow and distortion under heat. This dimensional stability under load enables top lifts to retain their shape, adding to walking comfort and attractive appearance throughout their service life. And the service life itself is longer because of the resins' resistance to abrasion.

With GRS, Durez resins are effective in small percentages – even as little as 5 to 10 parts of resin on 100 of rubber show results. If you have not looked into the advantage of phenolic resins in GRS, Buna N and other types of synthetic and natural rubber, you may find it highly profitable to talk things over with us. As a starter, let us send you the latest edition of our bulletin on Resins for the Rubber Industry.

DUREZ®

Phenolic Resins that fit the job

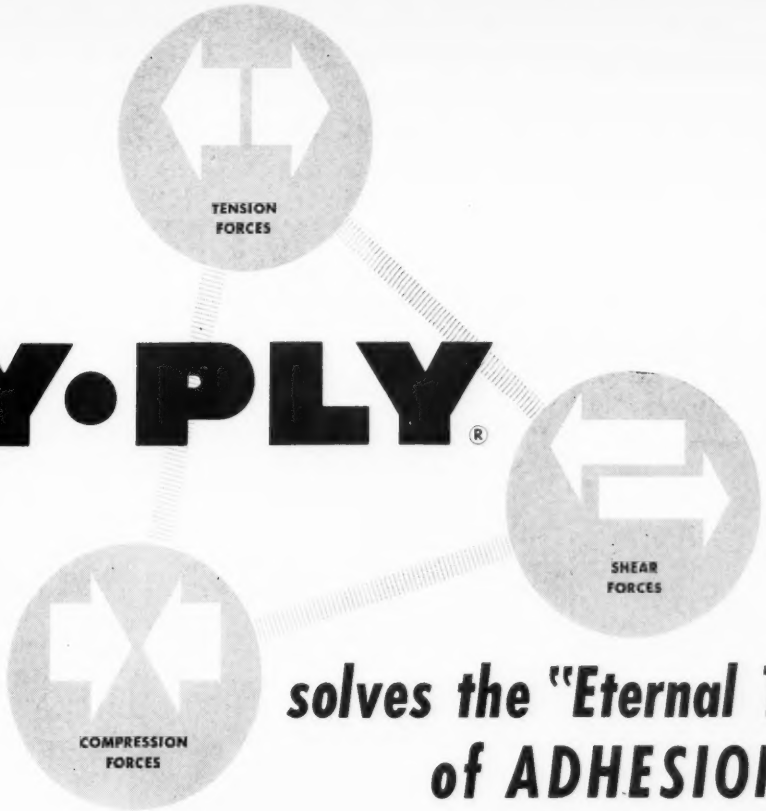
DUREZ PLASTICS DIVISION

HOOKER ELECTROCHEMICAL COMPANY

210 WALCK ROAD, NORTH TONAWANDA, N. Y.

HOOKER CHEMICALS PLASTICS

Export Agent: Omni Products Corp., 460 Fourth Avenue, New York 16, New York



TY·PLY®

solves the "Eternal Triangle" of ADHESION

TY-PLY...the RUBBER-to-METAL ADHESIVE *that bonds for a lifetime*

Recommended for the severest of Static, Dynamic, and Chemical Resistance Requirements!

TY-PLY is the ideal choice for vulcanized bonding of rubbers to metals under varying process conditions. Recommended and used for the widest variety of rubber-bonded units to meet the toughest of static, dynamic, and chemical resistance requirements.

TY-PLY "UP-BC"
two-coat Adhesive System for bonding of Butyl Rubbers.

TY-PLY "UP-RC"
two-coat Adhesive System for bonding Natural Rubber and GR-S Compounds.

TY-PLY "Q" or "3640"
the single coat Adhesive for bonding Natural and GR-S Compounds.

TY-PLY "BN"
for bonding N-types

TY-PLY "S"
for bonding Neoprene

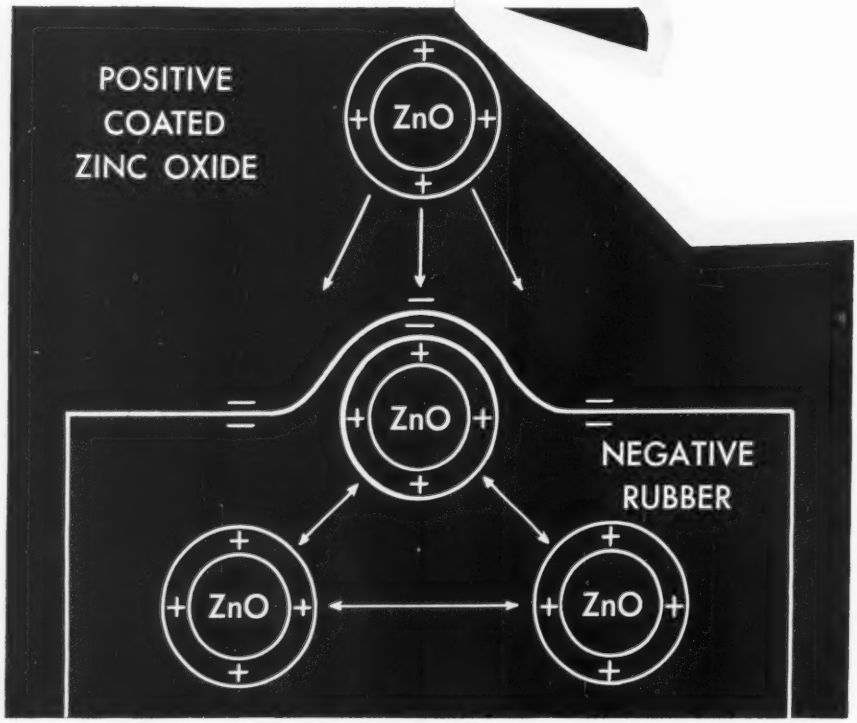
TY-PLY will adhere most vulcanizable rubber compounds to almost any clean metal surface

Marbon®

MARBON CHEMICAL
Division of BORG-WARNER
GARY, INDIANA

TY-PLY has stood the test of time . . . since '39

Coated ST. JOE Zinc Oxide provides better rubber processing



ST. JOSEPH LEAD COMPANY
ST. JOE ZINC OXIDE
JOSEPHTOWN, PA.

Technically speaking the monomolecular film of hydrophobic high molecular weight organic ester in St. Joe's *coated* zinc oxide has a more positive charge than that of rubber. Rubber has a greater affinity for coated oxide than uncoated pigment. Practically speaking this property results in faster dispersion and uniform incorporation into the mix.

Added values include:

greater moisture resistance, lower Mooney plasticity, lower permissible mixing temperature, increased mixing capacity, lower power consumption and lower power peak.

If you are not now using St. Joe *Coated* Zinc Oxide, why not order enough to make a good pilot plant test? Or better yet production test? This is the best way to prove to yourself that this grade of oxide would be best for your production and end-product.

ST. JOSEPH LEAD COMPANY

250 Park Ave., New York 17
Plant and Laboratory,
MONACA, (Josephtown), PENNSYLVANIA

THE Thiokol RUBBER REPORTER

GASKETS AND DIAPHRAGMS molded from "Thiokol" Synthetic Rubbers are highly impermeable to moisture, gases and most aliphatic and aromatic liquids.

LOW TEMPERATURE FLEXIBILITY. "Thiokol" synthetic rubbers have a broad service temperature range, running all the way from —60°F., without the use of low temperature plasticizers, to +250°F.

Versatile "Thiokol" Synthetic Rubbers Have Wide Range of Applications

TOUGH, SYNTHETIC RUBBERS BY "THIOKOL" SERVE INDUSTRY IN MANY WAYS

- Paint Spray, Gasoline and Aromatic Fuel Hose
- Coated Paper Gaskets
- Printing and Coating Rollers
- Permanent Putties
- Molded Diaphragms and Gaskets

"Thiokol" Synthetic Rubbers provide:

- resistance to oils and solvents
- low temperature flexibility
- resistance to sunlight, ozone and aging
- impermeability to gases, moisture and liquids
- adhesion as putties to glass, metals, wood and plastics

Solvent-resistant hose. Hose made from "Thiokol" synthetic rubber is used successfully with the most deteriorating organic solvents. It displays outstanding resistance to paints and paint thinners, lacquers, aliphatic and aromatic liquids.

Coated Paper Gaskets. Inexpensive paper gaskets are made tough and oil-resistant with uncured "Thiokol" synthetic rubber. Coating is accomplished quickly and easily by rolling, spreading or dipping.

Printing and Coating Rollers. Outstanding resistance to swelling in aliphatic and aromatic solvents makes "Thiokol" synthetic rubber ideal for fabrication of lacquer, paint and inking rollers.

Permanent Putties. Versatile putties made from "Thiokol" Synthetic Rubbers have found wide acceptance in the building, marine and maintenance fields. They resist major causes of deterioration, including solvents, chemicals, sunlight, aging and weathering.

Molded Diaphragms and Gaskets. Washers, gaskets and diaphragms made of "Thiokol" synthetic rubber give the ultimate in oil and solvent resistance . . . are unaffected by aging and stay flexible over a wide temperature range.

For more technical information about "Thiokol" Synthetic Rubbers, write: THIOKOL CHEMICAL CORPORATION, 784 NORTH CLINTON AVE., TRENTON 7, N. J. In Canada: Naugatuck Chemicals Division, Dominion Rubber Company, Elmira, Ontario.

Thiokol®

PIONEER MANUFACTURERS OF SYNTHETIC RUBBER

RUGGED TRAFFIC CONDITIONS – Almost 1600 tons of coarse, heavy slate are transported daily by means of this sturdy 30″ conveyor belt at The Southern Lightweight Aggregate Corporation's plant in Bremo Bluff, Virginia. This slate is first carried to huge crushers and then to kilns where it is transformed into SOLITE, a unique new aggregate used in the manufacture of structural concrete and lightweight masonry units that are just as strong as ordinary concrete units, but one-half lighter. Because of the continuous barrage of sharp, angular slate to which this particular belt is subjected, it required special engineering. It was manufactured by Boston Woven Hose and Rubber Company from fabrics especially developed for extremely rough usage by Mount Vernon Mills. Already, the belt has been in continuous use for over two years and is expected to remain serviceable for at least another—twice as long as any other belt ever before utilized for this brutal carrying operation.

This is another example of how fabrics made by Mount Vernon Mills, Inc. and the industries they serve, are serving America. Mount Vernon engineers and its laboratory facilities are available to help you in the development of any new fabric or in the application of those already available.

UNIFORMITY Makes The Big Difference In Industrial Fabrics

Mount Vernon Mills, Inc.

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how?

Koppers business is to help you make better rubber and better products of rubber—preferably with Koppers Chemicals. And we want to know how we can help you. Below are a few of our products and a few new ideas for their use. We hope they will give *you* some ideas with which to improve your products or your operations.

Modification

Koppers divinylbenzene is a well-known staple in plastics and rubber chemistry. It is used to modify the physical properties of certain synthetic rubbers to better suit them to calendering, molding, and extruding. But Koppers divinylbenzene has many additional uses when copolymerized with styrene and vinyl derivatives, and other organic compounds. It may be useful to you, in a new way. Send for Koppers Technical Bulletin on divinylbenzene.

Adhesion

In tire-cord adhesives a condensation product of formaldehyde and resorcinol, another quality Koppers chemical, gives the best possible bond between synthetic fibers and rubber. In addition to this well-known application, Koppers resorcinol has potential as a rubber photo-gelling agent, and when reacted with dihydric alcohols produces a promising rubber antioxidant. For other possible new uses, send for Koppers Technical Bulletin on resorcinol.

Inhibition

Koppers styrene monomer, used generally for a copolymer of butadiene to make GR-S type rubber, also can be combined with phenols to produce an excellent oxidation inhibitor for rubber goods. It also has potential as a raw material in the production of organic chemicals. You will find more complete information in Koppers Technical Bulletin on styrene monomer. Send for it.

dbpc,® antioxidant made by Koppers, is an excellent non-staining rubber antioxidant for white-wall tires, gloves, etc. And Koppers mono-tert-butyl-meta-cresol is a raw material for another superior non-staining antioxidant. Koppers Technical Bulletins on these products give full details.

Information

These are just a few of many quality chemicals made by Koppers. And we have been able to list only a few of their uses. Our research people, our engineers, our sales representatives are able and anxious to help these products serve you. Call the nearest sales office or write to Koppers Company, Inc., Chemical Division, Pittsburgh 19, Pennsylvania.

Koppers Company, Inc.
Chemical Division, Dept. RW-106
Pittsburgh 19, Pennsylvania

I'm interested in the following Koppers Chemicals:

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Please send complete facts.

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Firm .....

Address .....

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Sales Offices: **PITTSBURGH · NEW YORK · BOSTON · PHILADELPHIA · ATLANTA · CHICAGO · DETROIT · HOUSTON · LOS ANGELES · SAN FRANCISCO**

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SHAW rubber extruders

Britains best....

. . . firmly established in Britain, these machines are acknowledged to be unsurpassed.

built in Canada...

. . . to serve the Dominion and the United States with on-the-spot delivery.

Rubber extruders have been recognised as the most efficient machines for modern requirements. This type of machine is in four sizes having screw diameters of 2, 3, 4½ and 6 inches respectively. Among the leading features are—water cooled screw, steam heated and water cooled barrel and die head, constant or variable speed motor and screw and screw speed indicator. Write for full information on these and other machines.

WHEN SERVICE IS IMPORTANT . . .

. . . when high production, to exact standards, is the order, machines must be 100% reliable — that is what users have learned to expect from plant, but of equal importance is the on-the-doorstep service provided to keep your lines moving.

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P.3283

assurance to vinyl compounders—

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OXO ALCOHOLS

are evaluated in finished plastic compounds

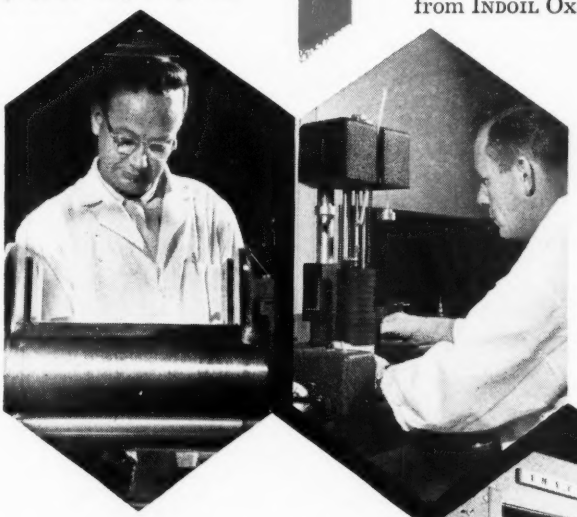
INDOIL Oxo Alcohols produce uniformly high quality plasticizers. This is regularly check-tested in finished plastic compounds by INDOIL's plasticizer evaluation laboratory. Compounders and molders get this benefit and assurance when they specify plasticizers made with INDOIL Oxo Alcohols.

If you are manufacturing vinyl products that require:

- Low volatile loss
- Resistance to extraction
- Low temperature flexibility
- Good electrical properties
- Resistance to heat and light

check your esterifier. Get plasticizers manufactured from INDOIL Oxo Alcohols.

INDOIL plasticizer evaluation laboratory checks quality of INDOIL Alcohols by testing derived esters in finished vinyl compounds. Here operator prepares a vinyl compound.



Typical properties of esters prepared from INDOIL Oxo Alcohols

	DIOP	DDP	DIOA
Specific Gravity 20/20	0.981	0.965	0.928
Color, APHA	< 25	< 25	< 25
EMC* phr at 1,600 psi	51.4	53.7	43.6
Refr. Index n_D^{20}	1.486	1.484	1.447
Visc. cs at 20°C.	74	120	18
Temp. at 100,000 Stokes, Vis., °C.	–42	–39	–70

*Equivalent Modulus Concentration

For additional information, write for INDOIL Bulletins Nos. 22 and 23.

Testing low temperature flexibility at INDOIL plastics evaluation laboratory.

Instron data are recorded to determine equivalent modulus concentration. Staff of trained plasticizer chemists make evaluations.

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INDOIL CHEMICAL COMPANY

910 South Michigan Avenue, Chicago 80, Illinois

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"the preferred rubber" for intricate automotive extrusions

THESE complicated windshield and rear window extrusions are excellent examples of why Ameripol man-made rubber is being specified as "the preferred rubber" for more and more automotive parts.

Ameripol has exceptional firmness in the uncured state. This means that intricate Ameripol extrusions retain their precise shapes until cured. And as finished products, they're not only accurate, but possess superior resistance to wear and tear. These outstanding advantages point up why you'll find Ameripol used in a growing number of quality products . . . tires, typewriter rolls, shoe soles and heels, conveyor covers and chute linings.

In *your* products, use the preferred rubber . . . Ameripol.

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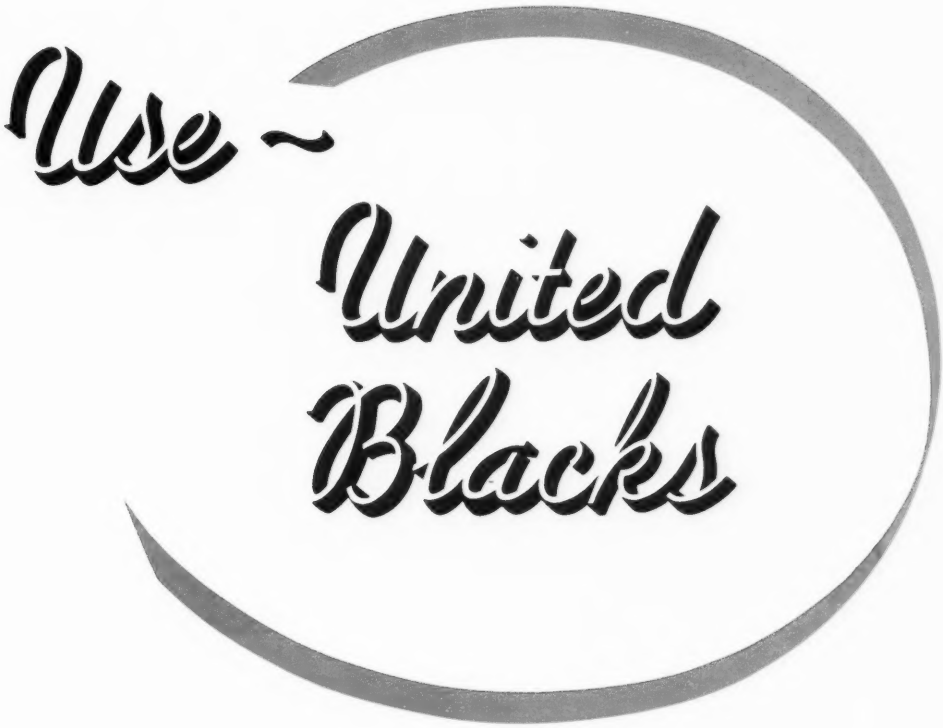
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Blacks

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Kosmos 20, Semi-Reinforcing (SRF) furnace carbon black, boasts by far the widest applications in various types of rubbers, and is indispensable to ever so many compounders.

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Kosmos carbon blacks are in the front for unsurpassed performance. It is wise to standardize on United carbon blacks and stay in the lead.

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Q Is it possible to get new machine performance in a rebuilt Banbury?

A Yes . . . when the manufacturer makes the repairs. Here's why:

As the sole manufacturer of the Banbury mixer for thirty-six years, Farrel-Birmingham is the only company with the complete knowledge and facilities required to return a worn machine to its original work capacity. What's more, a Banbury rebuilt by F-B benefits from a product-improvement program that has been carried on since manufacture of these mixers began. Improved materials and a number of modern design features can now be incorporated into a machine being rebuilt to make it even better than when first built.

Farrel-Birmingham is the only company with blueprints showing the original dimensions for everyone of the 775 parts comprising a Banbury mixer. This is essential information for correct, precise rebuilding work. When a part is worn, blueprints show F-B engineers just how much rebuilding is required to return the part to its original size, contour and work efficiency.

Farrel-Birmingham is the only company having the jigs, fixtures and gauges necessary for satisfactory repairs. 242 pieces of a new Banbury have to be machined, calling for a total of 882 operations to finish.

Every Banbury mixer that leaves the Farrel shop after rebuilding carries a new machine guarantee. This provides assurance that the rebuilt machine will be "as good as new" when it is returned to service.

So, when you need Banbury repairs or rebuilding, make sure you get the kind of job that will give you new Banbury performance—maximum service continuity.

Call the Farrel-Birmingham office nearest you.

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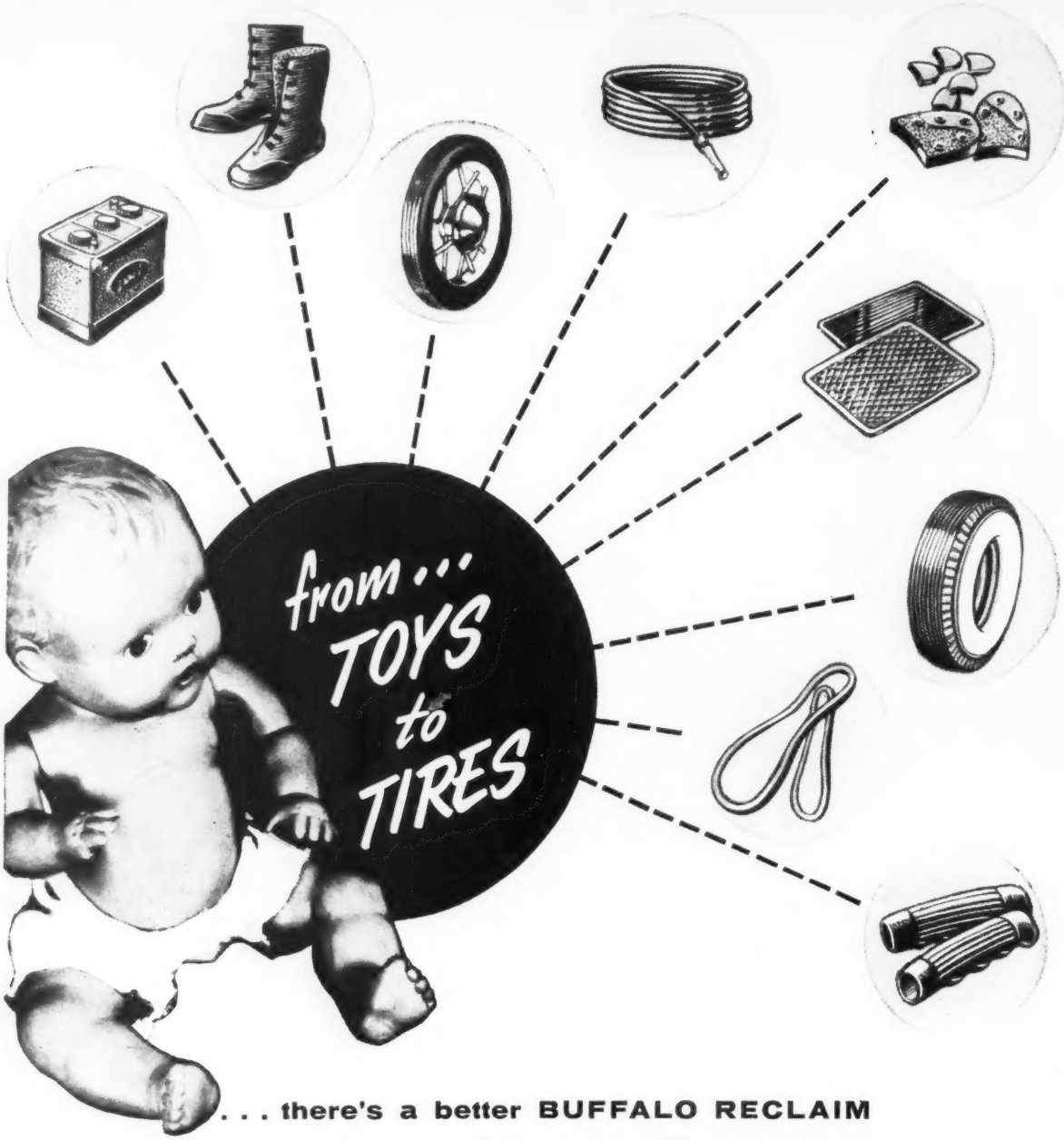

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No matter what you make of rubber . . . be it batteries or belting, hose or heels, there is a specially formulated U.S. Reclaim to help you make it faster, better and more economically. (Produced by our exclusive RECLAIMATOR process, U.S. Reclaims pass through an extremely short devulcanization cycle which retains MORE of the **original quality** of the rubber.) Write now for test sample. Always keep reclaims in your formula and always look to US for the BEST. U.S. Rubber Reclaiming Company, Inc., P.O. Box 365, Buffalo 5, N. Y. TRENTON AGENT: H. M. Royal, Inc., 689 Pennington Ave., Trenton, N. J.

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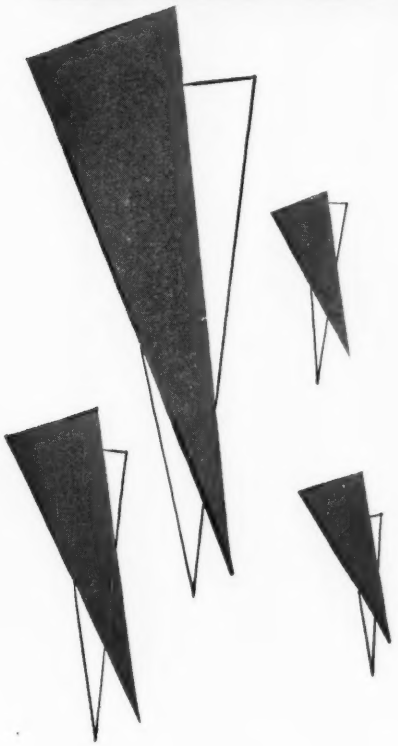

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For GR-S and Natural Rubber

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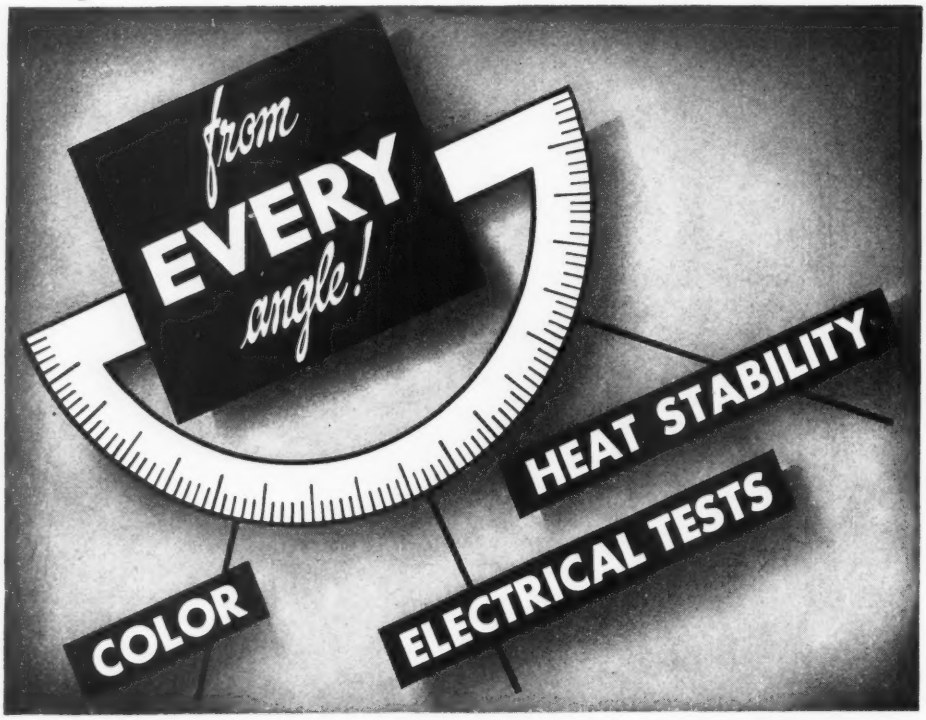

PIGMENT NO. 33

for Compounding

VINYLS AND SYNTHETIC RUBBER

Sample and technical data sent promptly on request

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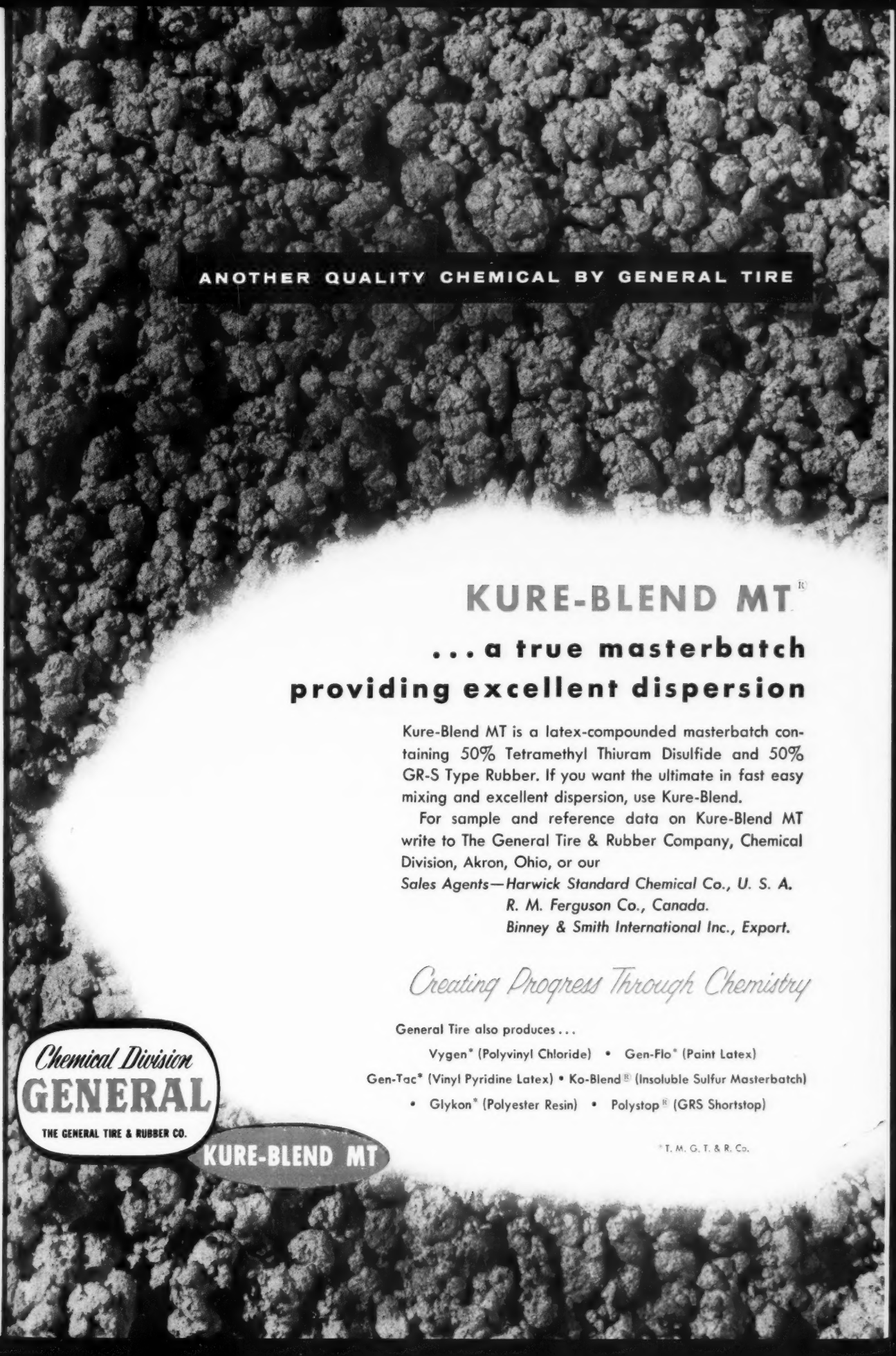
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...a true masterbatch
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Kure-Blend MT is a latex-compounded masterbatch containing 50% Tetramethyl Thiuram Disulfide and 50% GR-S Type Rubber. If you want the ultimate in fast easy mixing and excellent dispersion, use Kure-Blend.
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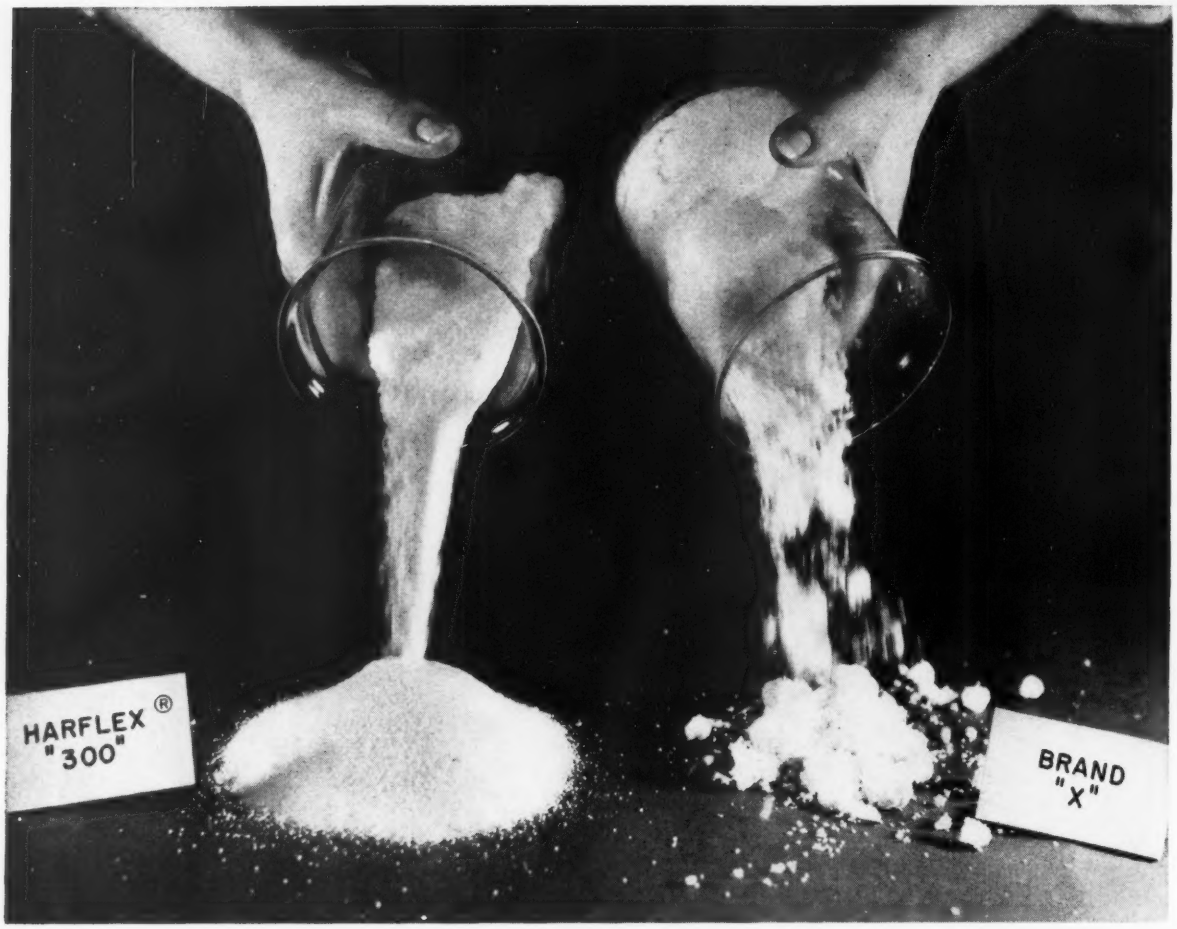

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PERMITS A FREE FLOWING DRY BLEND

In a typical test, 64 parts of **HARFLEX®** 300, preheated to 212°F, were mixed with 100 parts of an easy-processing polyvinyl chloride resin at 212°F. After 30 minutes of thorough agitation, a dry, free flowing powder was obtained which could be put directly into an extruder. When a free flowing dry blend is used directly, as in extrusion operations, it is possible to eliminate or minimize extra operations such as Banbury mixing or roll milling.

HARFLEX® 300 is a permanent polymeric plasticizer, readily adaptable to dry blending. Write for our free technical bulletin that gives full information about **HARFLEX®** 300. Samples for your test or experimental work are also available at your request.

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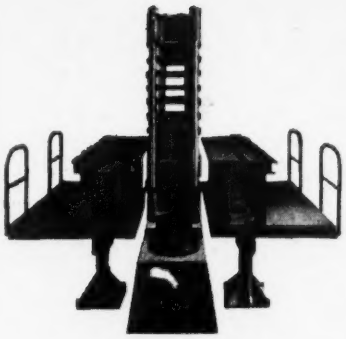

192-ton Multiple Opening Platen Press. Designed for molding rubber products. This press may be operated from an individual self-contained pumping unit or a central accumulator system. Two elevators operate with two presses working side by side. Write for catalog and engineering information on this and other R. D. Wood hydraulic presses for rubber, plastics, metalworking, and woodworking—without obligation.

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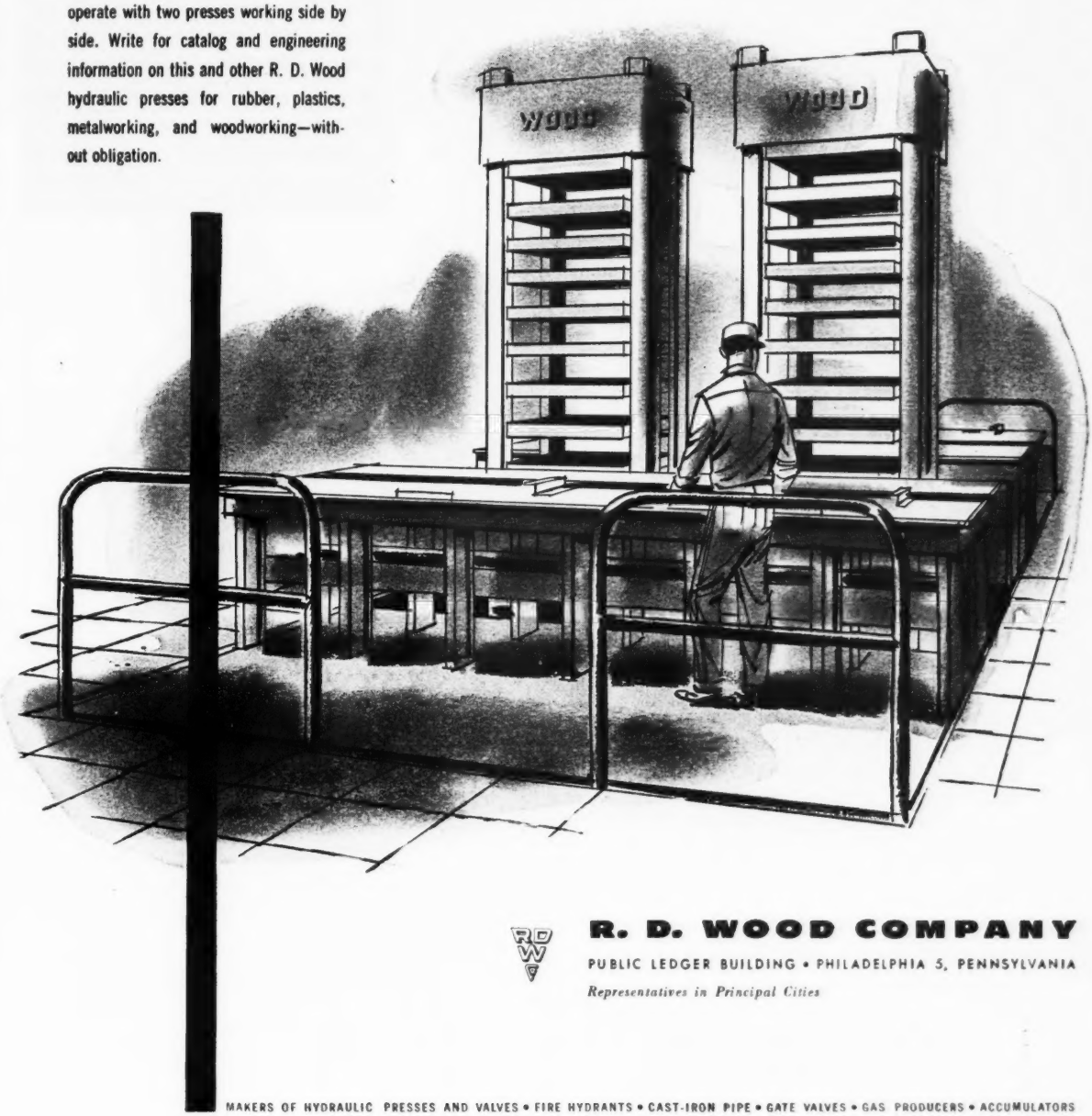

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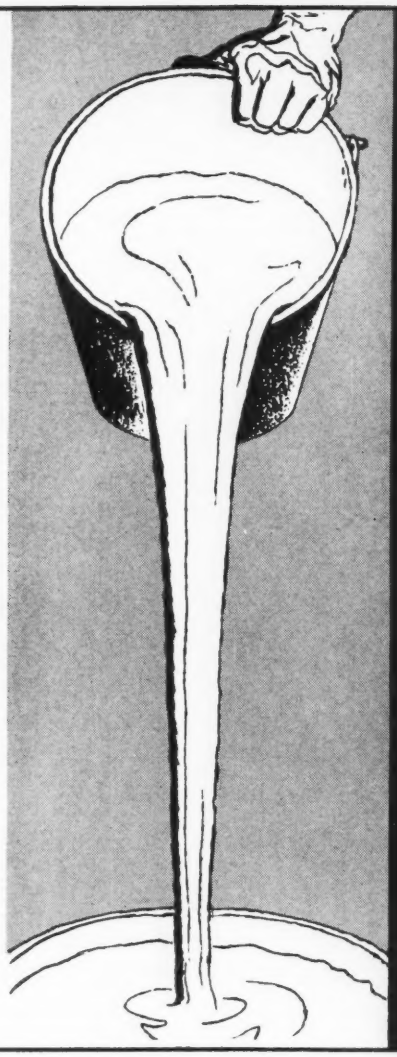

the thickener that pours easily!

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A SYNTHETIC POLYMER

You're likely to find an ideal combination of advantages when you thicken latex with Modicol VD. For this synthetic polymer gives uniform high viscosity . . . smooth and gel-free . . . even at very low concentrations.

Modicol VD pours easily, saves you time, guesswork and material waste.

Modicol VD not only eliminates creaming and separation but also improves mechanical stability of the latex emulsions. These are all typical advantages. Why not find out how Modicol VD can help improve your own processing. Simply send today for bulletin MVD 33 to Nopco Chemical Company, Harrison, N. J.

Advantages of MODICOL VD

Easy to handle
High uniform viscosity at low concentrations
Smooth gel-free type of viscosity
Stable in alkaline fluids
Unaffected by bacteria or fungi

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PLANTS: Harrison, N. J.
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"Awright, Let's Get Crackin!"

Tires, or any other rubber products, unless effectively protected are subject to ozone attack.

Protection from ozone cracking is reliable and economical with Universal's high potency rubber antiozidants, the new UOP 288 and the widely-used 88.

These Universal antiozidants are heat stable, of finest purity, provide controlled uniformity and offer complete protection under both static and dynamic exposure.

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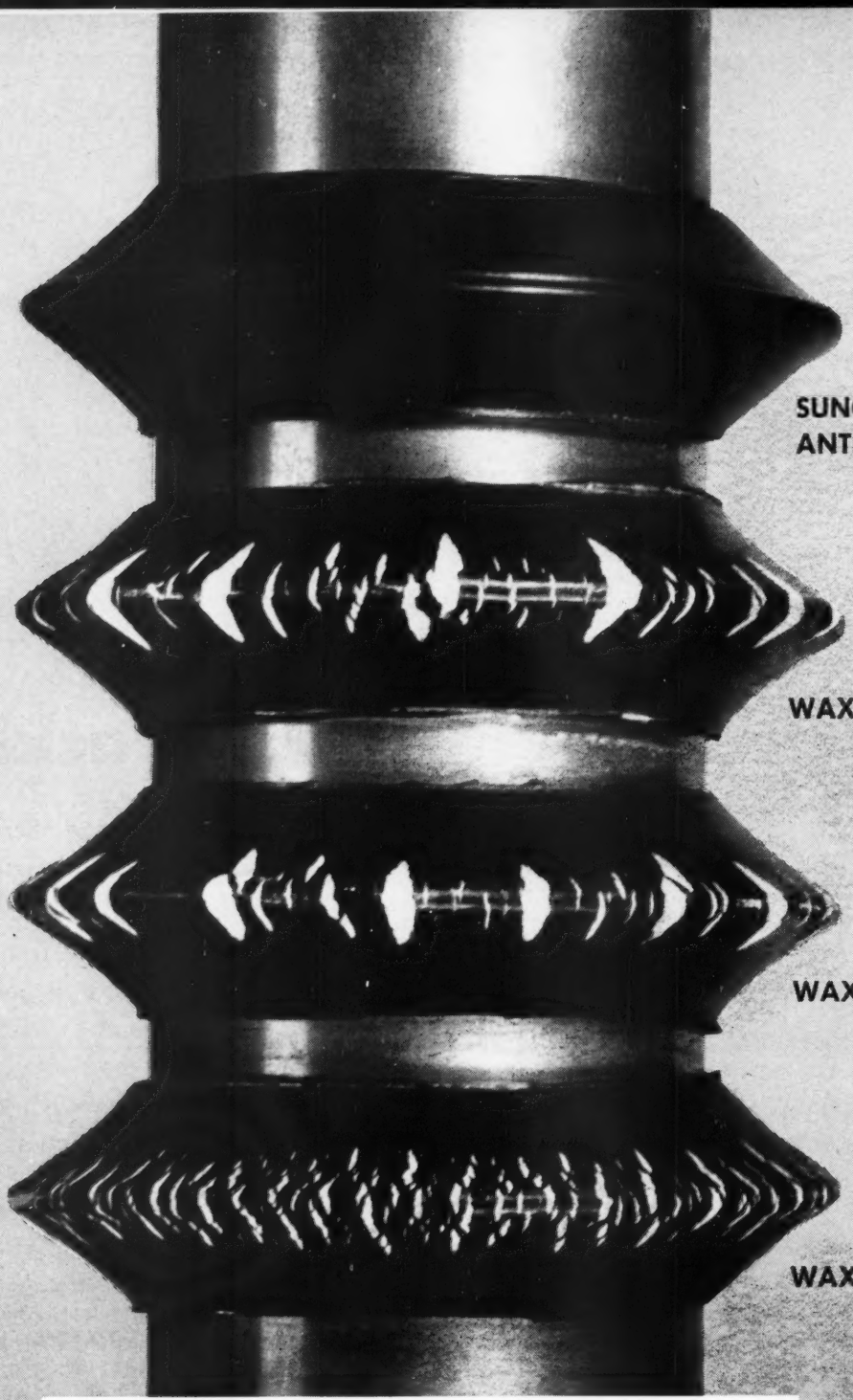
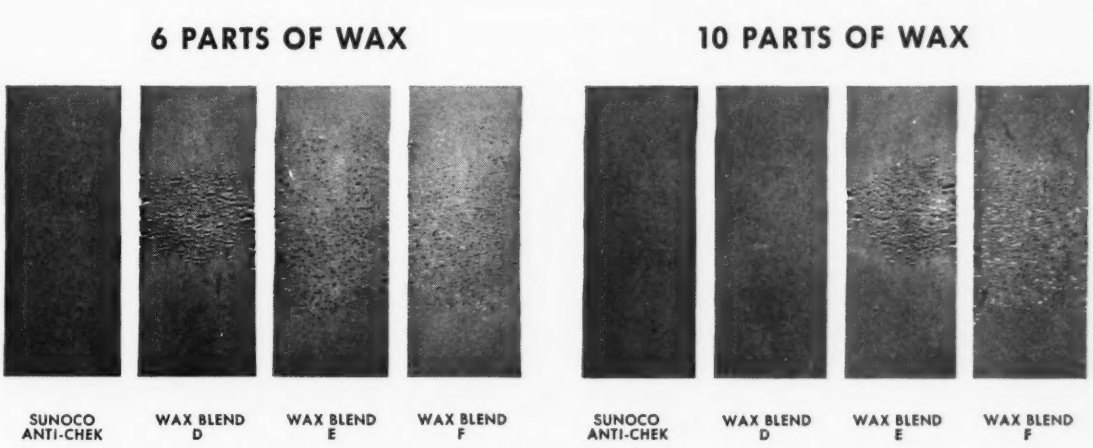


STANDARD A.S.T.M. OZONATOR TEST run for 100 hours proves Sunoco Anti-Chek® superior to ordinary wax blends. These stocks were tested in accordance with the method outlined in A.S.T.M.'s "Method of Test For Accelerated Ozone Cracking of Vulcanized Rubber" (Designation: D 1149-51T). Brushed on talc brings out defects. Note lack of checking and cracking in stock containing Sunoco Anti-Chek. Samples containing ordinary wax blends show varying degrees of deterioration.



LESS SUNOCO ANTI-CHEK NEEDED. These rubber test specimens show that *less* Sunoco Anti-Chek is needed to give *better* protection than you get with ordinary anti-checking wax blends. Ozonator and weathering tests prove that six parts of Sunoco Anti-Chek give equal or better protection than 10 parts of wax blends D, E and F.

Sunoco Anti-Chek Gives More Protection Against Cracking . . . Checking

After rigorous testing, Sun's researchers found that a special wax, Sunoco Anti-Chek, tailor-made for rubber, gave far greater protection than *ordinary* paraffin-microcrystalline blends that form brittle and much-too-thick films.

The rate of bloom determines how long an anti-checking wax protects rubber. Ordinary wax blends bloom too quickly and protection is short-lived. Sunoco Anti-Chek blooms at just the right rate to assure adequate long-life protection. In other words, to get protection for a given time, you need *less* Sunoco Anti-Chek.

For further information on Sunoco Anti-Chek, see your Sun representative or write for Technical Bulletin 30, SUN OIL COMPANY, Philadelphia 3, Pa., Dept. RW-10.

ASK FOR THIS FREE TECHNICAL LITERATURE

- Sun Rubber Process Aids (set of three bulletins describing product qualities of Circosol-2XH, Sundex-41, Sundex-53).
- Sunoco Anti-chek wax: Bulletin 30.
- An Ozonator for Accelerated Testing of Rubber: Bulletin 36.
- A Method for Classifying Oils Used in Oil-Extended Rubbers.

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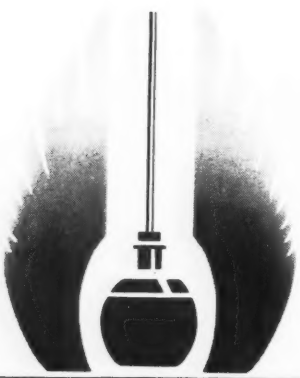

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Here at Adamson we've been doing something that we believe is rather unique in the industry. Every now and then a manufacturer of rubber or plastics has expressed a desire to discuss certain problems pertaining to calendering or calendering equipment, and we have invited him and his associates to our conference room for a roundtable session with our staff. No one dreamed the idea up—it just grew. Some of the largest manufacturers in the industry have been our guests and have described the meetings as helpful and enlightening.

Certainly, since we build calenders and related equipment, these clinics have been of great value to us. And because we believe that a free exchange of opinions and ideas is the surest way to promote progress and improvement in any industry, we extend to you and your company a cordial invitation to our conference room. Perhaps, like the famous riddle of which came first, the chicken or the egg, many questions will have to be left unanswered, yet the benefits to be derived from a free discussion of our common problems cannot fail to be mutually helpful.

Why not 'phone or write us for a conference date? The obligation will be all ours.

Adamson United Company

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tire-bags
foam rubber
mechanical goods
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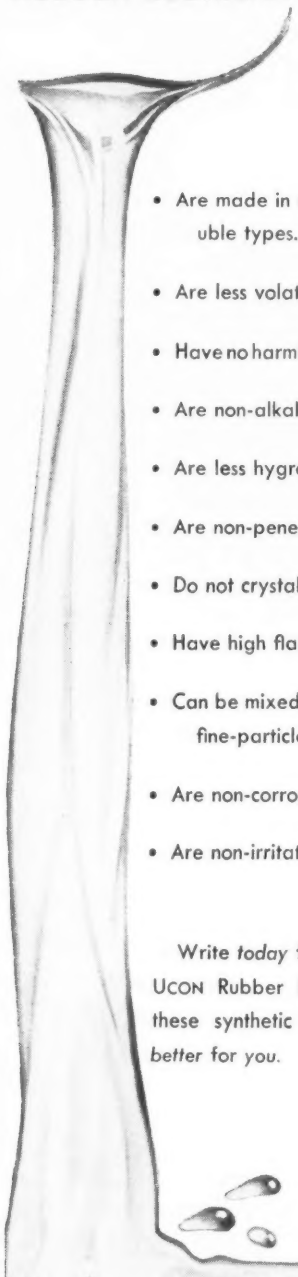
cutting tools



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- Are less volatile than glycerine.
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- Are non-alkaline.
- Are less hygroscopic than glycerine.
- Are non-penetrating.
- Do not crystallize or cause bloom.
- Have high flash points.
- Can be mixed with solvents, wetting agents, fine-particle solids, or silicone emulsions.
- Are non-corrosive to the common metals.
- Are non-irritating to the skin.

Write *today* for complete information on UCON Rubber Lubricants. You'll find that these synthetic lubricants can do a job *better* for *you*.

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NEW RUBBER PELLET COOLER

by SARGENT

Cooled from 300° to 110° in less than 10 minutes . . .
Dried to 0.5% with a production better than 12,000 lbs. per hour.

Rugged prefabricated structural steel housing permits record-quick installation in your plant. Sturdy and vibration-free. Hinged side doors permit easy accessibility to entire interior of the machine.

Sargent exclusive design conveyor flights of perforated stainless steel present smooth unbroken surface to travelling pellets, reducing tendency to dust as they dry. Sargent feed delivers level, continuous bed of pellets to conveyor.

Sargent Dryers for the rubber industry give you new standards, modern engineering, proven performance.

For more information, please write us.

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ATLANTA, GA. — J. R. Angel, Mortgage Guarantee Building
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Naugatuck Butadiene-Styrene Latices

Made in our own synthetic rubber plant, Naugatex® R-S latices are characterized by excellent mechanical stability, good color and superior aging. In general, their particle size is considerably smaller than that of natural rubber latex.

By varying the ratio of styrene to butadiene, the molecular weight of the polymer, the type of emulsifier system and the temperature of polymerization, Naugatuck chemists have given these Naugatex latices a variety of characteristics not possible in natural latex. The following specific types are in wide demand for use in the foam sponge industry, and in tire cord solutions—with or without the addition of Naugatuck's Pyratex® vinyl pyridine latex:

NAUGATEX 2000—A medium-solids, "hot" latex of about 50% styrene and of intermediate Mooney viscosity. For tire cord solutioning.

NAUGATEX X-765—A "cold" latex of small particle size. Polymer is about 25% styrene, of high Mooney viscosity. Developed to provide the advantages of low-temperature polymerization, it is used in some tire cord solutioning formulas.

NAUGATEX 2105—A high-solids, "cold" latex of about 25% styrene and a Mooney viscosity of 140. Has better color and uniformity than previous cold latices. Is the most successful we have yet developed for foam sponge manufacture.

For more complete details contact the Naugatuck branch office nearest you or write direct to the home office at Naugatuck.

United States Rubber

Naugatuck, Connecticut

BRANCHES: Akron • Boston • Chicago • Memphis • New York • Philadelphia • **Mfg.:** Naugatuck • Gastonia • Los Angeles • **CANADA:** Latex Div., Dominion Rubber Co., Ltd., Montreal • **Cable:** Rubexport, N. Y. Rubber Chemicals • Synthetic & Reclaimed Rubber • Plastics • Agricultural Chemicals • Latices

Improved Performance

for Neoprene Compounding

- **Better Curing**
- **Better Physicals**

GENMAG MLW

Magnesium Oxide

Bulk Density	18-22 Lbs.
Moisture	Nil
MGO (Ignited Basis)	97.9%
Chlorides	Nil
Manganese	.0003%
Activity	Moderate

General Magnesite
& MAGNESIA COMPANY

P. O. Box 671 - Norristown, Pa.

Instant

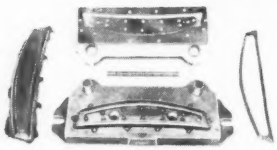
FLASH TRIM DIES

...with accuracy

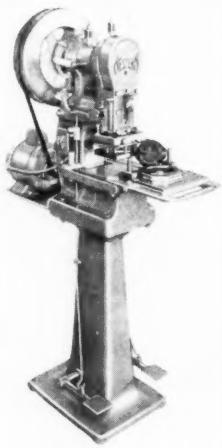
and CLICKER DIES

WESTERN DIES are precision made for fast trimming with extreme accuracy. Their super-sharp cutting edges insure clean cuts. Punching dies are machined to close tolerances. Experienced personnel stand ready to tackle any die problem. Send us a sample, a blueprint or sketch of your die needs for our recommendation. No obligation.

NO JOB too big—too small —too intricate—or too rugged for a WESTERN made die.



Clicker Dies and Hand Mallet Dies receive careful attention and PROMPT DELIVERY.



RMH MACHINE

performs many operations basic to the rubber industry. It cuts, punches and trims in one swift precision perfect operation.

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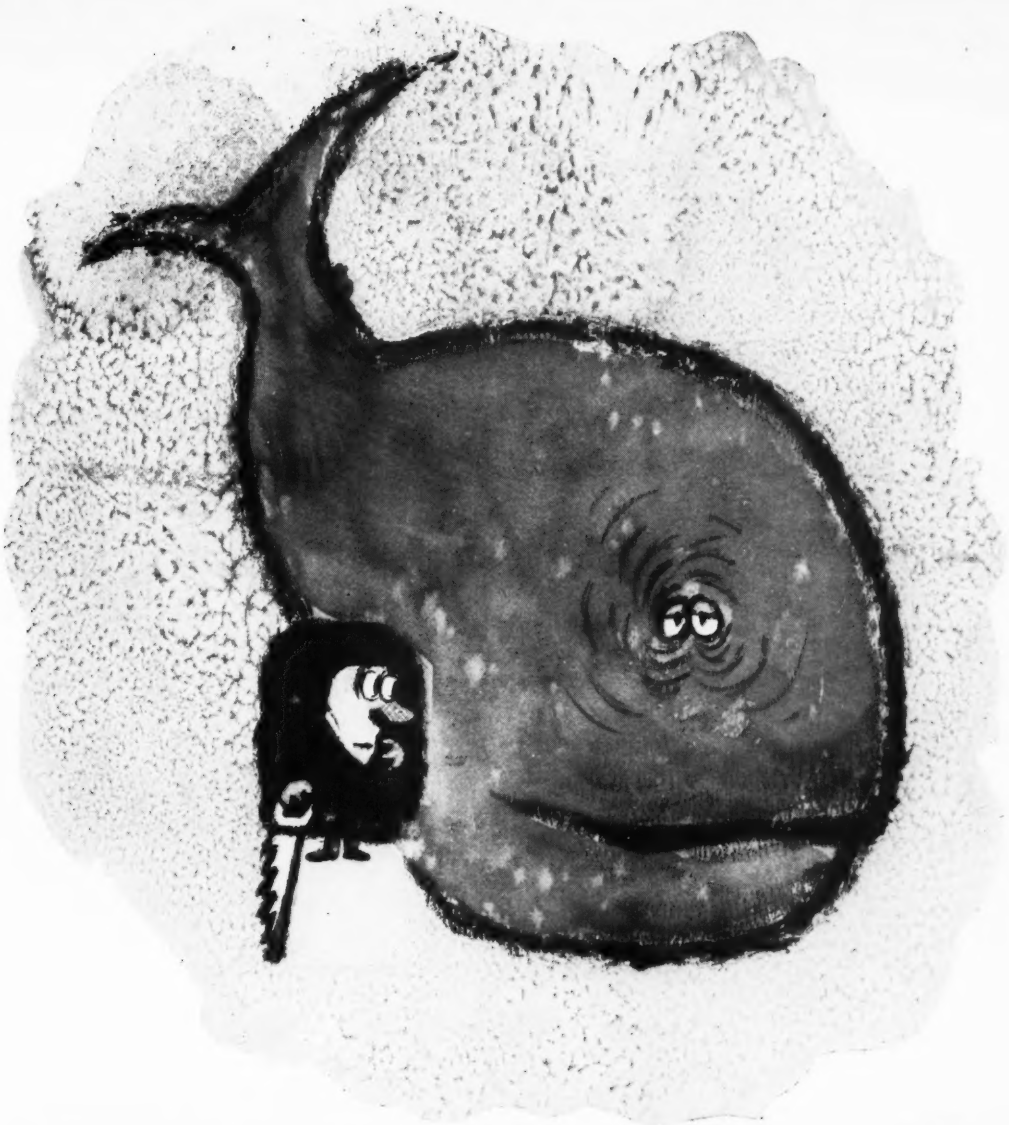

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means *well-packaged* **cold** rubber

means *uniformity* in cold rubber

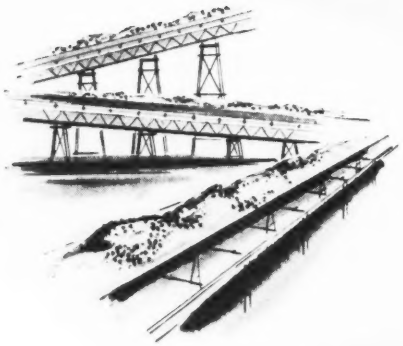
means *pioneering* in cold rubber

means *good service* in cold rubber

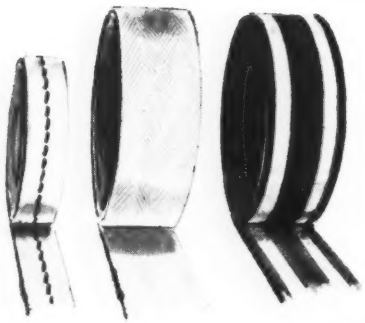
and . . . means *high quality* cold rubber

COPOLYMER RUBBER & CHEMICAL CORPORATION
BATON ROUGE 1, LOUISIANA

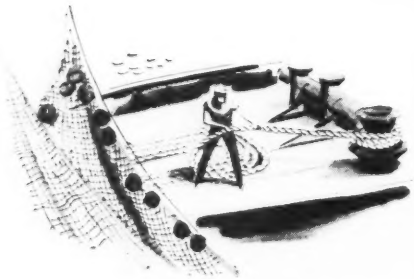
COLD RUBBER SPECIALISTS!



Conveyor Belts



Webbing



Rope

Allied Chemical's

caprolan®

tensile-tough nylon

NYLON HEAVY YARNS

OFFER UNUSUAL TOUGHNESS AND LONG FLEX LIFE IN HEAVY-DUTY INDUSTRIAL FABRICS

Caprolan *tensile-tough* nylon heavy yarns (2000 denier and up) are a completely new yarn class that assures unusual durability and economical performance in such industrial products as duck, webbing, rope and similar constructions.

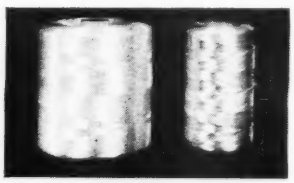
For heavy-duty applications, this new kind of nylon combines toughness, high impact strength, abrasion resistance, long flex life, and – for conveyor belts – excellent troughing qualities.

Where color is desired in nylon, Caprolan also offers a previously unavailable affinity for virtually any class of dyestuff, and can provide quality color rendition of dyes in shorter dye cycles.

Caprolan nylon heavy yarns eliminate the need to ply multiple ends of finer deniers to achieve a higher total effect. They can be engineered as high as 50,000 total denier, according to your specifications, and are put up on a new 30-lb. package as well as on 10-lb. packages.

You will want to look into such Caprolan economies as longer runs between creelings . . . ready dyeability . . . elimination of costly fine denier inventories . . . and the unusual and lasting whiteness of Caprolan that develops no appreciable yellowing in storage.

Caprolan heavy yarns already have been established in many leading mills. For more information or technical assistance, call or write us today.



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Branch Offices—Jefferson Standard Building, Greensboro, N. C., 200-204 S. Front St., Phil. 6, Pa., 15 Westminster St., Providence 3, R. I.

What's Non-Scorching GENMAG MLW? -NEVER HEARD OF IT!

Probably they never heard of NEOPRENE either, or how important the GENMAG Calcined Magnesias are in compounding for better results in all NEOPRENE applications —

GENMAG Medium Light Calcined Magnesia Extra Light Calcined Magnesia

GENMAG MLW is a magnesium oxide slightly denser than the extra light that has been designed for neoprene compounding of the most difficult type. It offers great scorch resistance and excellent cures. Economical in price, too . . .

OTHER IMPORTANT USES . . .

GENMAG Magnesias are high-purity, low in Manganese and free of chlorides. They are packed to keep those properties and thus provide BETTER RESULTS in all Neoprene applications. . . . Other uses include casein cement, fluorescent tube coating, gas-tight cements, reagent for powdered oils, filler for artificial leather, dental compositions, textile sizing, plastics reactant and filler, etc.

Manufactured by General Magnesite & Magnesia Co.

Write for complete technical data on these magnesias and also on heavy magnesium oxides (calcined magnesites) number 500 or 600.

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CARTER BELL PRODUCTS
1903
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Types, grades and blends for every purpose, wherever Vulcanized Vegetable Oils can be used in production of Rubber Goods—be they Synthetic, Natural, or Reclaimed.

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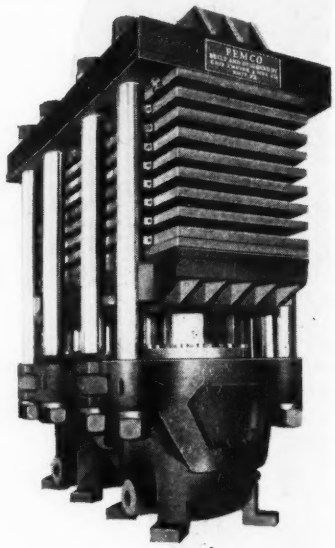
LAMINATORS

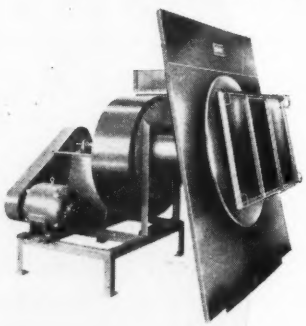
. . . check with
ERIE ENGINE & MFG. CO.
before you buy another press



EEMCO hydraulic presses are specially built to meet your requirements. Individual pumping units, automatic cycle and timing controls optional. Shown: 51″ x 150″ Laminating Press.

REINFORCED PLASTIC MOLDERS

. . . look at an ERIE ENGINE proposal
—it may save you money!



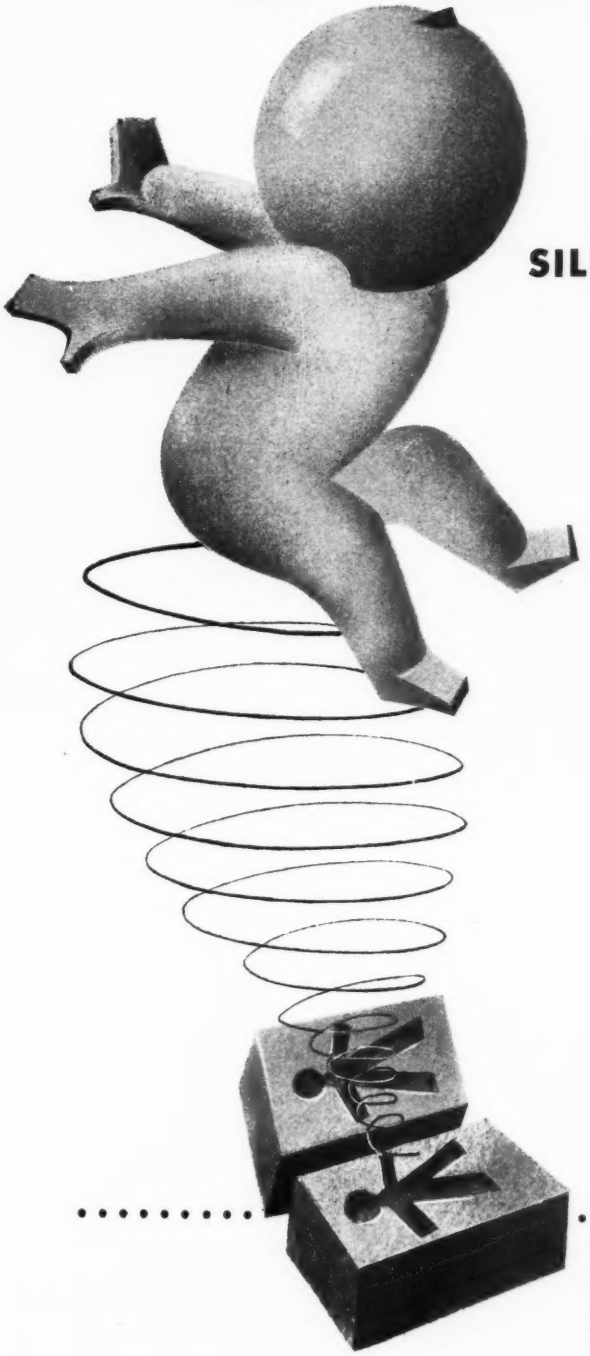
Fiberglass preform machines, roving cutters, ovens and hydraulic presses designed and built for processing reinforced plastics to fit your specific needs.

Consult EEMCO for complete plant layout . . . or single unit installation.

ERIE ENGINE & MFG. CO. **designs and builds a complete line of mills and hydraulic presses for the *RUBBER, FIBERGLASS, PLASTICS* and *WOOD PRODUCTS* Industries.**

EEMCO **ERIE ENGINE & MFG. CO.**
12th St. & East Ave., ERIE, PA.

PARTS POP FROM MOLDS



when you use G.E.'s new, improved **SILICONE MOLD LUBRICANT, SM-62**

General Electric's new silicone mold lubricant, SM-62, offers molders of tires, mechanical rubber goods and plastics quick, easy release—even on the toughest jobs. Parts "come clean"—with better surface finish, sharp detail, close tolerances.

Here are some of the special benefits which SM-62 offers you:

1. **Better surface finish**
2. **Better mold coverage**
3. **Improved stability under mechanical agitation**
4. **Improved stability at high temperatures**

Economical, SM-62 saves you time and money. Non-carbonizing, it reduces mold cleaning costs and down time—minimizes rejects! Only small quantities are required.

NEW APPLICATION FACTS

General Electric has prepared complete, new packages of application data on *silicone mold lubricants* and *antifoam* agents for the rubber and plastics industries. For a free copy of this latest information, just fill in and mail the coupon below.

Progress Is Our Most Important Product

GENERAL ELECTRIC

SILICONE PRODUCTS DEPARTMENT
GENERAL ELECTRIC COMPANY
Section 167-1B
WATERFORD, NEW YORK

Please send me a free copy of your application data on the following:

( ) Rubber mold lubricants
( ) Plastics mold lubricants
( ) Antifoam agents
( ) Include free sample of SM-62 mold lubricant

Name _____ Position _____

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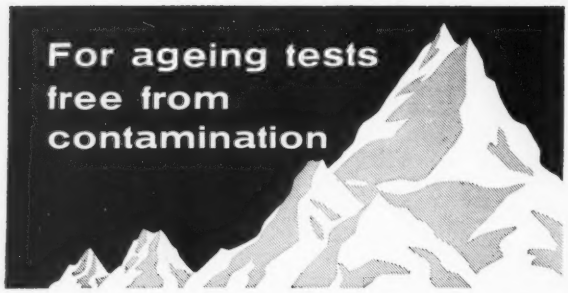
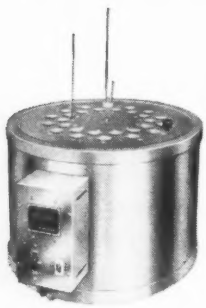
IN CANADA, MAIL TO CANADIAN GENERAL ELECTRIC CO., LTD., TORONTO



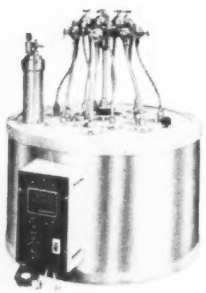
Scott Testers, Inc., Aluminum Block Heating Baths are designed to test a number of isolated specimens simultaneously, completely free from contamination.



SCOTT TESTER* MODEL LG

With 28 separate containers, for temperatures up to 550°F, for Test Tube Ageing per A.S.T.M. D865-54T and Immersion Test per A.S.T.M. D471-55T.

Request Literature



SCOTT TESTER* MODEL LGP

Tests at elevated temperatures in pressured air or oxygen per A.S.T.M. Specifications D572-53 and D454-53.

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Your Testing Problem is Our Business

Send data on your testing problems and we will offer suggestions.

57 years of experience at your command

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Another coating problem solved by Borden . . .

versatile Plastisol finish gives industrial gloves iron-hand strength with kid-glove comfort

WHEN the Plasticote Glove Co. of Milwaukee, Wis. perfected their well-known industrial gloves, they used a Plastisol surface coating developed by Borden that helped provide oil, chemical and abrasion resistance, long wear, and flexible, comfortable use.

The wide variety of qualities Plasticote found in Borden's Plastisols might help you with your needs, as well. They're easy to handle, won't freeze, are unusually stable in storage, contain no volatile materials, and have remarkable aging properties. What's more, they have excellent heat stability and are non-flammable. And, of course, the exact degree of toughness, flexibility, and abrasion and chemical resistance you need will be compounded to your specifications by Borden engineers.

Plastisol coatings are but one more example of Borden's wide experience as specialty compounders in the industrial coating and adhesive fields. If you have a product that may be developed or improved through use of the right resin emulsion, solution, or hot melt for adhesive bases, binders, coatings, sizes and saturants, take advantage of Borden's experience. If time is of the essence . . . phone us and we'll have a technical representative at your plant within 48 hours. The Borden Company, Resinous-Reslac Department RW-106, 103 Foster St., Peabody, Mass. In Chicago: Resinous-Reslac Department, 3634 W. 38th Street, Chicago 32, Illinois. In Canada: American Resinous Chemicals of Canada, Ltd., 20 Trent Street, Toronto, Canada.

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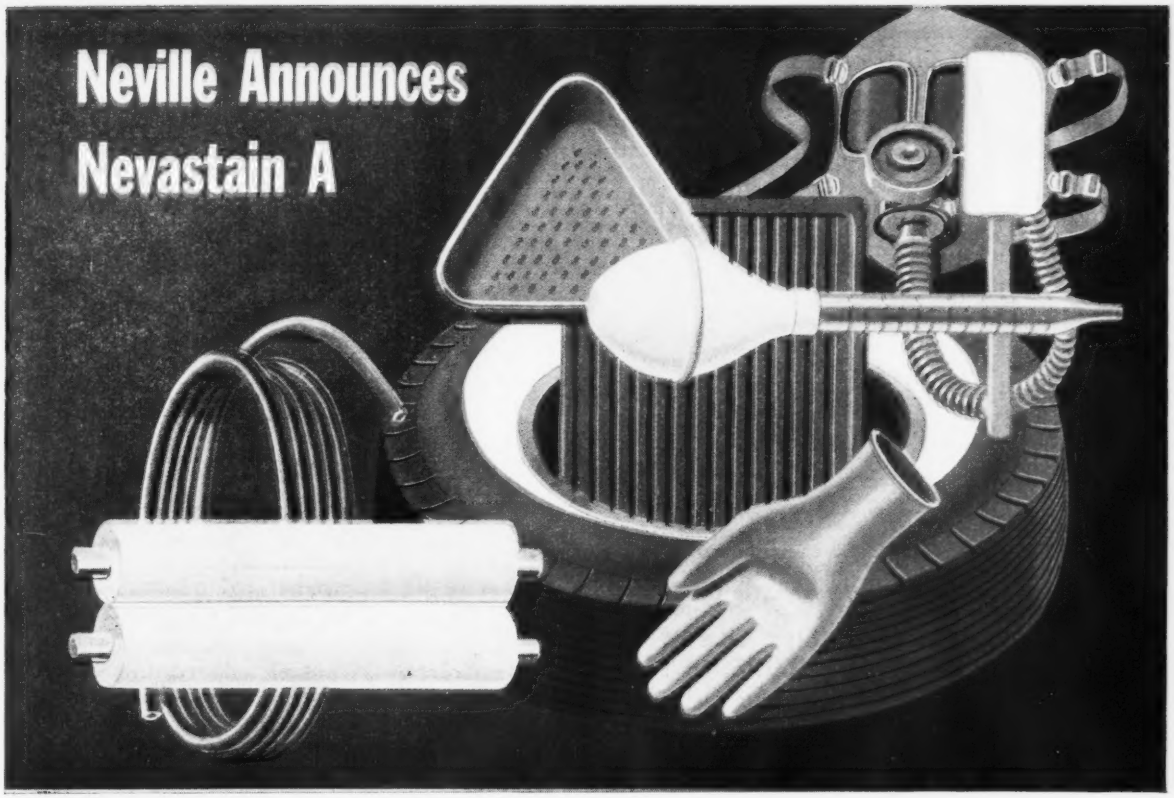

A New Non-Staining Rubber Antioxidant with Superior Characteristics

Nevastain A is an excellent non-staining, non-discoloring antioxidant with very low volatility and good stability. Synthetic and natural rubber compounds using Nevastain A have superior physical characteristics over those containing competitive non-staining antioxidants. Among its virtues are that it does not retard vulcanization, does not have an accelerating effect and does not bloom uncured or cured stock when used in normal quantities. This new product is being produced on a plant scale and is readily available and attractively priced. Use the coupon below to write for Technical Service Report No. 45.

Neville Chemical Company, Pittsburgh 25, Pa.

Resins—Coumarone-Indene, Heat Reactive, Phenol Modified Coumarone-Indene, Petroleum, Alkylated Phenol • **Oils**—Shingle Stain, Neutral, Plasticizing, Rubber Reclaiming • **Solvents**—2-50 W Hi-Flash, Wire Enamel Thinners.

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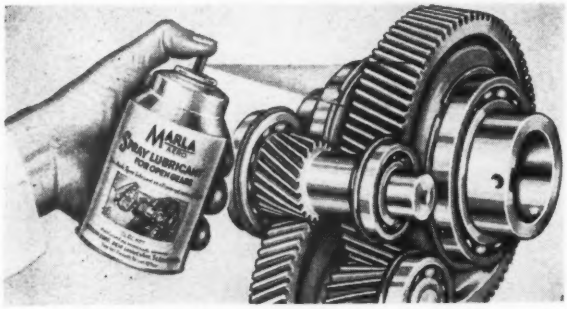

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Absolutely Nothing Else Like It!
OUTLASTS ORDINARY LUBES 5-to-1
Sticks to Metal

1. ECONOMICAL — Spray container reduces lubrication time. Long lasting film. One can covers approximately 25 sq. ft. of surface with no waste.
2. HEAVY DUTY—The finest extreme pressure adhesive lubricant there is for open gears.
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5. SPRAY—Assures perfect lubrication even to the most hard-to-get-at areas.
6. HANDY—Marla Spray Lubricant can be carried easily and is always ready for use. Eliminates the brush, paddle or any pre-heating.
7. VERSATILE — A superior lubricant also for cams, reciprocating actions, mono rails, guides, chains, sprockets and cables.

Prices F.O.B. Your Plant

Case of Six—12-ounce Cans $10.74

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The Institution of the Rubber Industry

LONDON

The I.R.I., which was founded in 1921, is now a great association of people engaged in all branches of the Rubber Industry. Its members include rubber producers, manufacturers, scientists, technologists, executives, students and others, in many countries of the world.

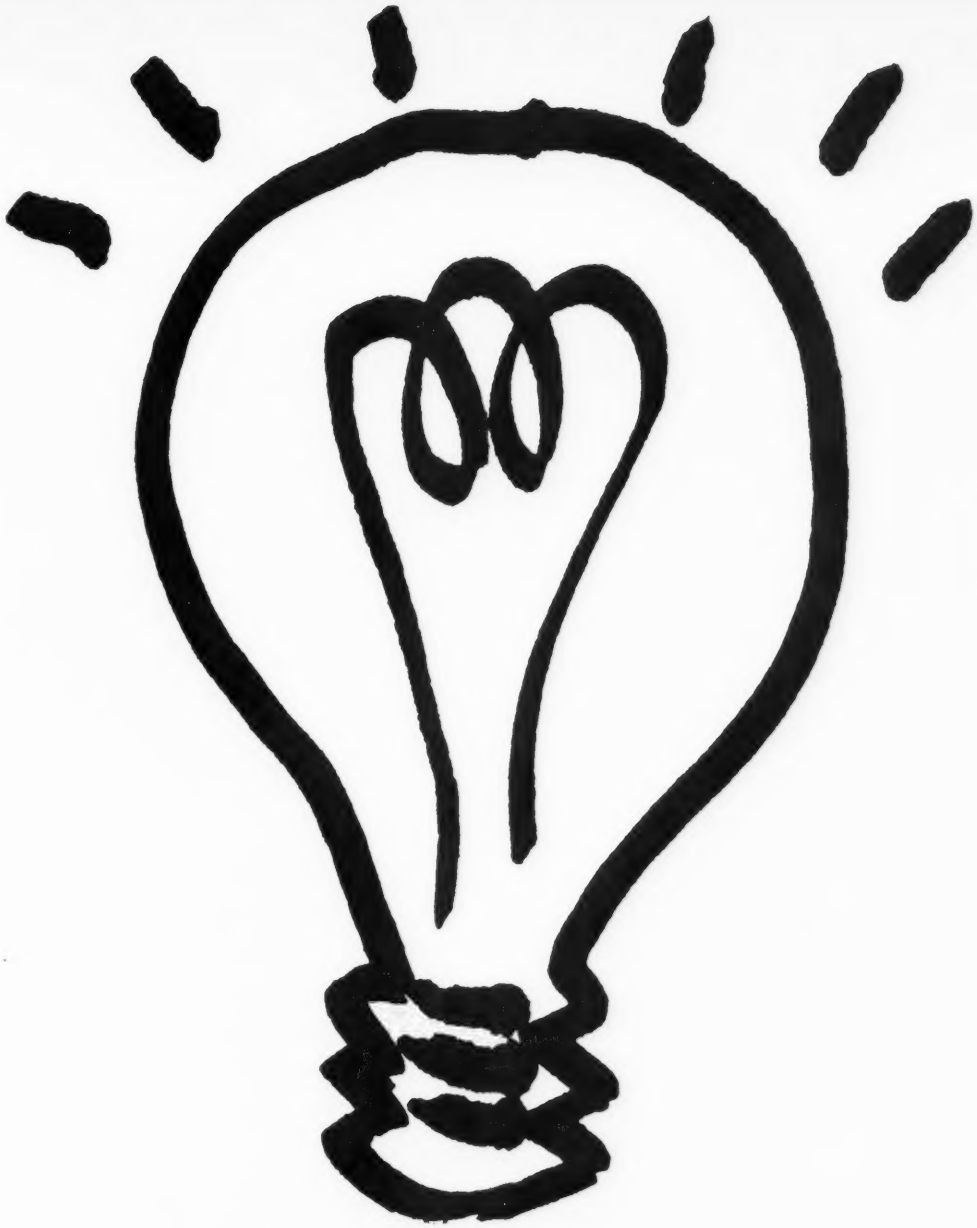
It has reached its present position of authority and respect through the high standard it has set for the technical literature it publishes, the diplomas it awards, and the meetings and conferences it organizes.

In collaboration with other Societies, it aims to raise the standing of the Industry throughout the world by improving the technical qualifications of its personnel, extending the study of its raw materials, processes, and products, and by promoting the exchange of technical discovery and information by means of literature, conferences, and meetings.

Membership of the Institution is open to all interested at an annual subscription of $7.50 which entitles the member to receive the bi-monthly Transactions free of charge and to purchase other publications (such as the Annual Reports and Monographs) at reduced rates. It also serves to put him in touch with his colleagues and their work in other parts of the world and confers on him full rights to vote, to nomination for election to the Council and to participate in meetings and Conferences organized by the Institution.

Complete details are easily obtained by writing to:

SECRETARY
INSTITUTION OF THE RUBBER INDUSTRY
4, KENSINGTON PALACE GARDENS
LONDON, W. 8, ENGLAND



Helping You Develop Your Ideas For Rubber Formulation Is Our Business

New ideas can be the most practical, too. Formulations—like ideas—should change with the times. Like this idea that one rubber processor had that his tread stock could be improved.

The Problem: Produce GR-S HAF black tread stock with maximum resistance to ozone under dynamic and static conditions.

Here's What Monsanto Compounders Did: Compounded a GR-S 1500 HAF black tread stock with Santoflex* AW alone and in combination with Flectol* H, Santoflex DD and three other commercial antioxidants. The stocks were also checked after the addition of paraffin.

The Results: Without exception, a stock with 2 parts of Santoflex AW proved most practical under dynamic or static exposure tests both in the ozone test chamber and in outdoor exposure. Paraffin was shown to add measurably to static ozone resistance without seriously harming the cracking under dynamic conditions.

Helping you get superior processing and product performance is the only way we can sell. So call upon 30 years of experience in helping *chemically* to make rubber processing more efficient, rubber products better. If you think your tonnage is too small for a special research project, don't hesitate to talk it over with Monsanto. Among the 18,000 or so special reports—the answer to your problem may already be at hand. Just call, wire, or write: *MONSANTO CHEMICAL CO., Rubber Chemicals Dept. RC-2 (Telephone: HEmlock 4-1921), Akron 2, Ohio.*

*Reg. U. S. Pat. Off.

Accelerators • For fast, slow, and regulated rates of safe cure.

Antioxidants • For maximum oxidation resistance.

Specialty Compounds • For special processing problems.

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RC Plasticizers FOR LOW TEMPERATURE FLEX IN SYNTHETIC AND NATURAL RUBBERS

If You Want...
- Superior Flex
- Reduced Nerve
- Low Volatile Loss
- Smooth Extrusions

RC PLASTICIZERS
TG-8
TG-9
BD-8

If You Want...
- Processing Aid
- Resilience
- Gasket Materials
- Excellent Retention

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Choose the right plasticizer to do the job best. We'll send you a brochure on other RC products that can speed your operation, improve finished products.

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Ready...reliable...RC serving American industry, since 1930

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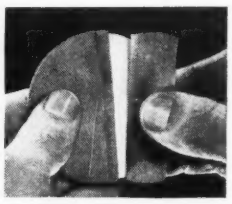
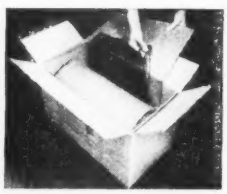
Patapar
RELEASING PARCHMENTS

peel off easily
from pressure sensitive
and tacky surfaces

Separator for rubber tape — just the right "release" action



Ideal backing for pressure sensitive surfaces



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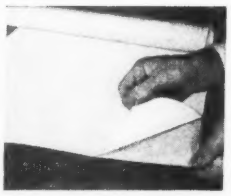

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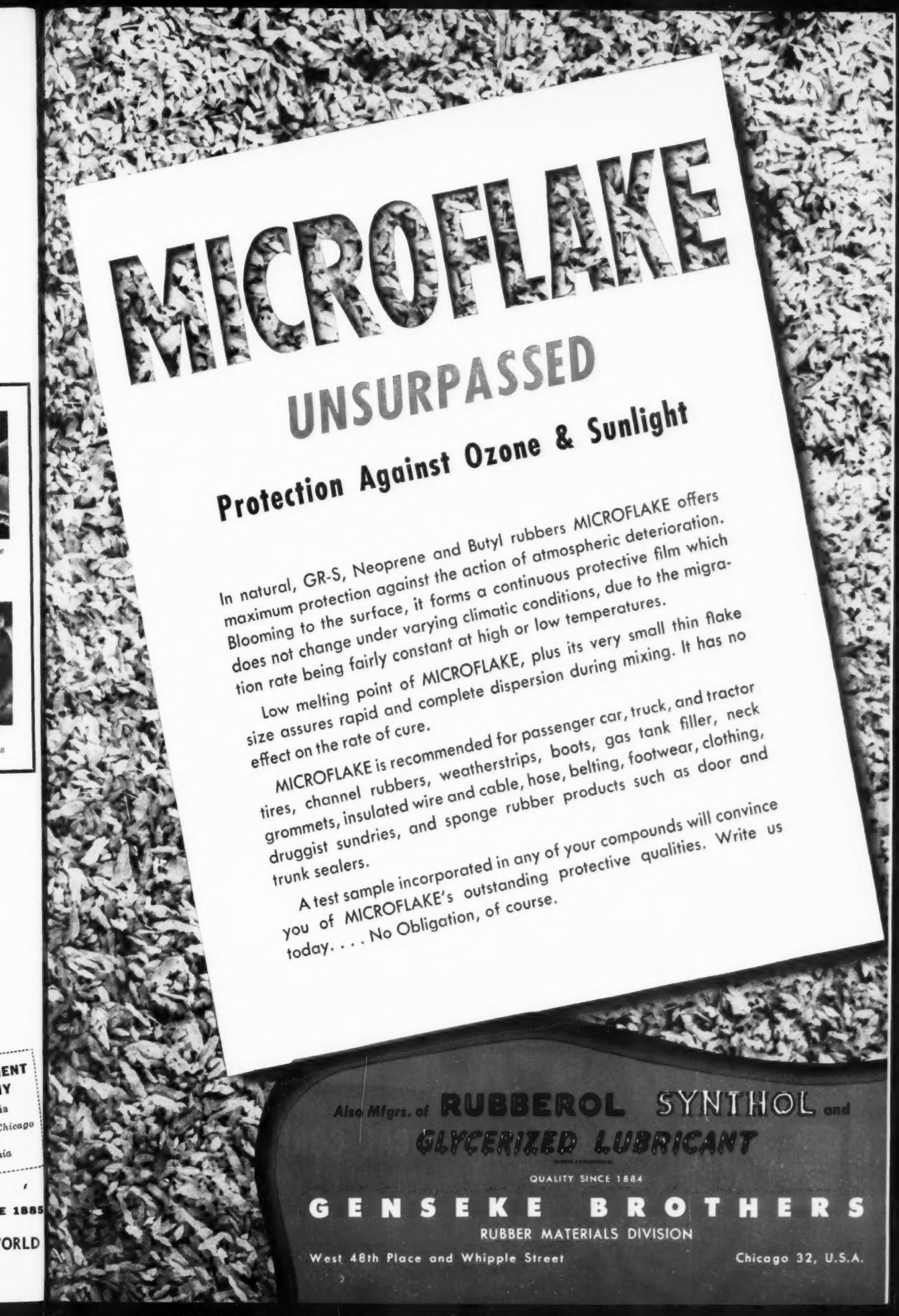
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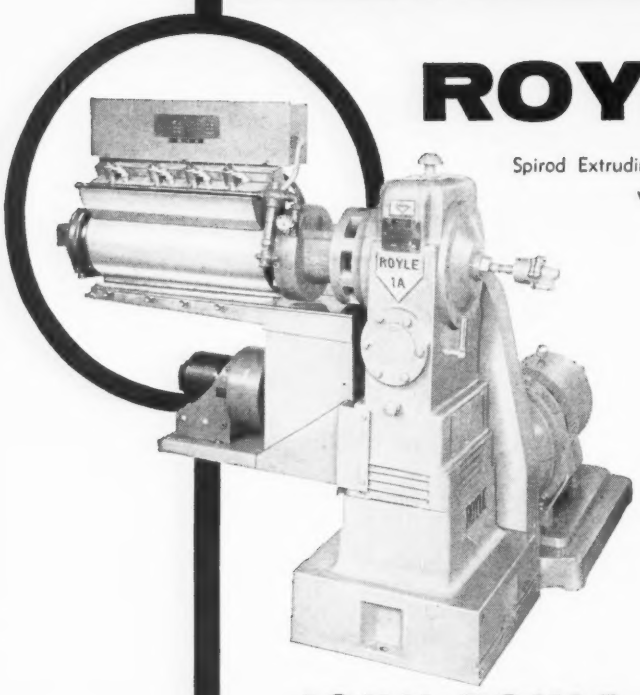

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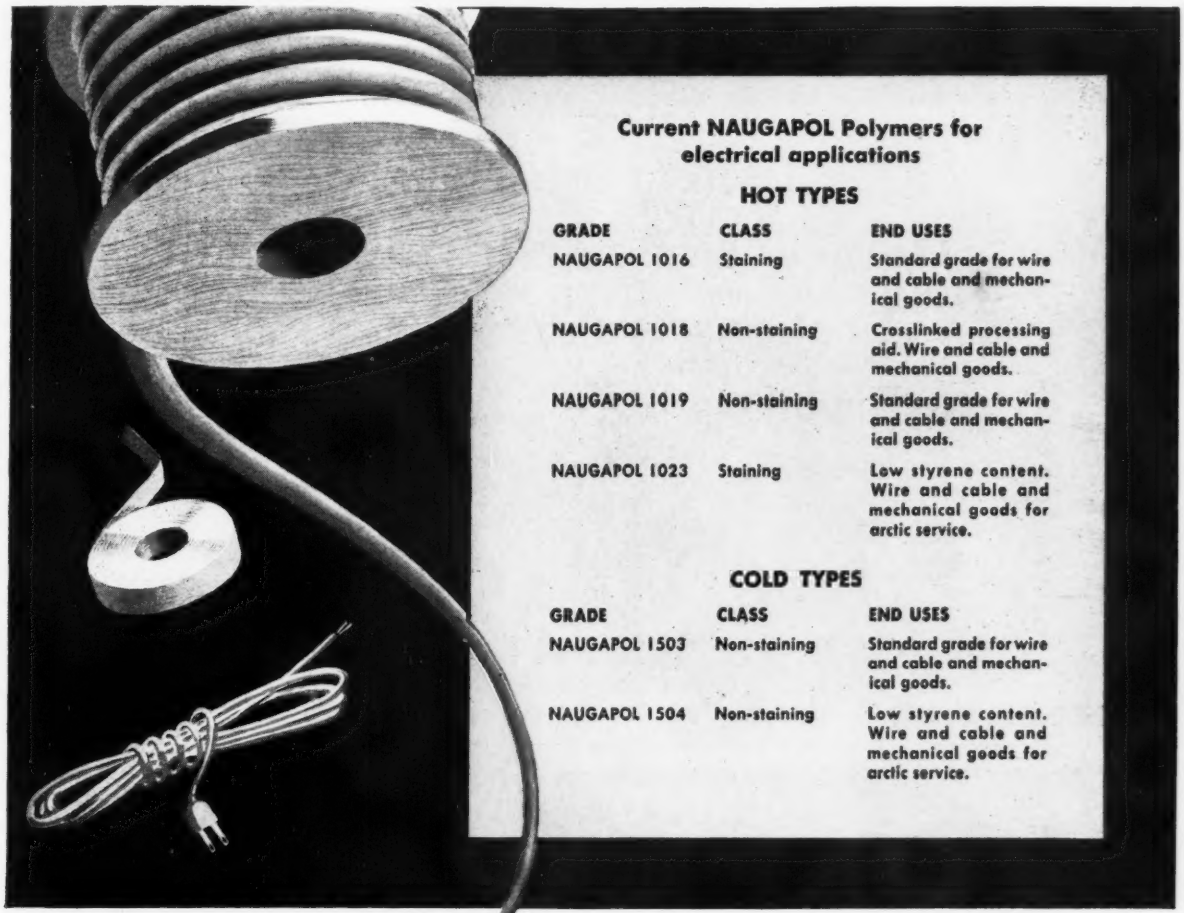

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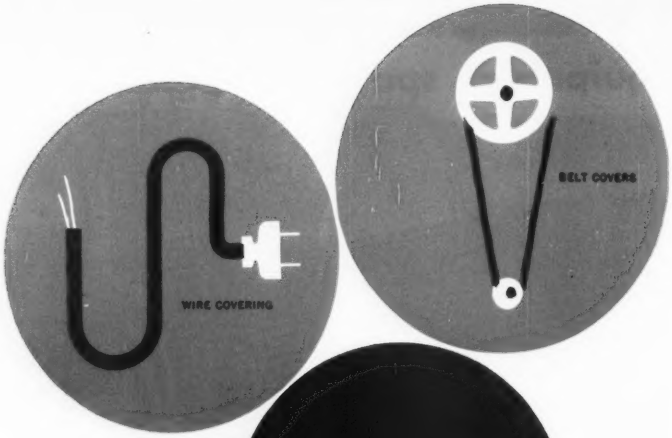

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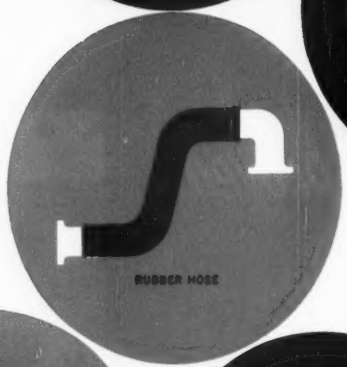

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RUBBER WORLD

OCTOBER, 1956

VOLUME 135, NUMBER 1

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Gerard Kraus

Degree of Cure in Filler-Reinforced Vulcanizates by the Swelling Method—I[1]

By GERARD KRAUS

Phillips Petroleum Co., Bartlesville, Okla.

It has been shown that the swelling of vulcanizates in solvents gives an accurate measure of the degree of vulcanization even in filler-reinforced stocks. The results are apparently not obscured by adsorptive linkages between filler and polymer. When chemically different polymers are compared, the swelling volumes may be used to calculate the density of the effective network chains; thus a nearly absolute measure of the degree of vulcanization is obtained.

The swelling method is not difficult to apply, requires no special equipment and imposes no limitation on the size or the shape of the test specimen. For instance, it has been used with excellent success in this laboratory to check the state of cure in fleet test tires. A small sample is cut from the side of the first rib of a tire and tested as usual.

THE physical properties of a rubber vulcanizate depend mainly on three factors: the chemical constitution and physical structure of the polymer; the type and degree of cross-linking; and the reinforcement by fillers. It is now widely recognized that these factors are by no means independent of each other. Thus, the chemical nature of the polymer obviously determines the type of cross-linkages which can be introduced into the rubber. Fillers contribute to cross-linking by adsorption of the polymer molecules on their surface and appear capable of modifying the course and efficiency of vulcanization reactions either directly or through adsorption of curatives.

This complex and delicate interplay of chemical reactions and physical phenomena complicates the very definition of such quantities as degree of vulcanization or state of cure in a filler-reinforced vulcanizate. Are effective cross-links due to adsorption by the filler to be counted as contributing to the degree of vulcanization? If not, then how can the two types of linkages be distinguished from each other? It seems that the answer to these questions can best be provided by the physical properties of the vulcanizate itself or, more specifically, by their response to changes in the variable chosen as representative of the degree of cure.

It is apparent that the degree of vulcanization must be identified with some variable characteristic of the number of cross-links introduced. It should also take cognizance of the fact that a network formed from low molecular weight polymer will require a greater number of cross-links for its formation than one formed from high molecular weight rubber. This fact suggests

[1]Presented before the Division of Rubber Chemistry, ACS, Philadelphia, Pa., Nov. 4, 1955.

The Author

Gerard Kraus, manager, rubber reinforcement section, research and development department, Phillips Petroleum Co., attended the University of Prague and Southern Methodist University and received his B.S. degree from the latter university in 1943. He received his Ph.D. degree in physical chemistry from the University of Cincinnati in 1947.

Dr. Kraus was first an instructor and then an assistant professor at the University of Cincinnati from 1947 until when he joined Phillips Petroleum in 1953.

He is a member of the American Chemical Society, the Faraday Society, Sigma Xi, and Phi Lambda Upsilon.

the number of effective network chains per unit volume of rubber (or its reciprocal, the molar volume of a network chain) as a suitable measure of vulcanization. This quantity is not only a logical choice, but one which offers very little difficulty toward its measurement.

For a gum vulcanizate it can be determined with little ambiguity from equilibrium modulus or swelling data by means of the statistical network theory of rubber elasticity and the thermodynamics of swelling (1).[2] If this same quantity is chosen as criterion for the degree of vulcanization of a filler-reinforced stock, then the filler will clearly exert an effect on the result. It will be shown that regardless of the nature of the apparent filler contribution it is desirable to have the filler effect included in the "degree of cure."

In gum stocks it makes little difference whether the number of effective network chains is ascertained from swelling or modulus data; with filler-reinforced stocks the swelling technique offers decided advantages. The difficulties associated with the determination of equilibrium moduli for any vulcanizate are several. When the sample is stretched to a fixed elongation, the stress decays very slowly, apparently without reaching an equilibrium value (2).

This difficulty can be overcome by first prestretching the specimen to a higher elongation (3), but even then the total amount of time necessary to obtain an equilibrium value is of the order of hours. Another method is to swell the specimen in the vapor of a solvent while under stress and then dry the specimen *in situ* (2), a procedure hardly conducive to routine testing. In filled stocks there is the additional complication due to the well-known Mullins (4) effect if the prestretching method is employed; deviations from the simple kinetic theory stress-strain relation are also more pronounced than in gum stocks.

Satisfactory equilibrium moduli can be obtained rapidly by measurements on fully swollen gum stocks (2, 5, 6). This method can be adapted to filler-reinforced elastomers by also prestretching the sample. In this instance, however, knowledge of the swelling volume is also required so that the measurement of the modulus becomes redundant provided the necessary solubility relations are known for the polymer. In the present work the approach chosen was to develop these relations from data on gum stocks and to rely on swelling measurements alone for the determination of the density of effective network chains in all vulcanizates including those containing reinforcing fillers.

Theoretical Aspects

The number of effective network chains per unit volume of rubber (ν) is given in terms of swelling volume by the well-known Flory-Rehner (7, 8) equation

$$\nu = -\frac{1}{V_s} \cdot \frac{\ln (1 - v_r) + v_r + \mu v_r^2}{v_r^{1/3} - \frac{2v_r}{f}} \qquad (1)$$

where v_r *is the volume fraction of rubber in the swollen network,* V_s *is the molal volume of the solvent,* f *is the functionality of the cross-links,* and μ *is the Huggins solubility parameter.* (The notation differs significantly from that of Flory only in that ν is referred to *unit volume.*) When the network is formed in the presence of diluent such as is the case in oil-extended rubbers, Equation 1 takes the form

$$\nu' = -\frac{1}{V_s} \cdot \frac{\ln (1 - v_r) + v_r + \mu v_r^2}{v_r^{1/3} v_0^{2/3} - \frac{2v_r}{f}} \qquad (2)$$

where v_0 *is the volume fraction of network rubber in the original stock,* and ν' *is now the density of network chains based on the extracted volume* (9). For most purposes, however, the desired ν will be one that is based on the unextracted volume; hence,

$$\nu = v_0 \nu' = -\frac{v_0}{V_s} \cdot \frac{\ln (1 - v_r) + v_r + \mu v_r^2}{v_r^{1/3} v_0^{2/3} - \frac{2v_r}{f}} \qquad (3)$$

Since synthetic emulsion polymers usually contain some 5% to 7% of fatty acid and soap, Equation 3 should, strictly speaking, be used at all times. Unless v_0 is smaller than 0.80, however, the difference will be trivial so that in practice it is only necessary to resort to the more complicated Equation 3 for oil-extended rubbers.

The solubility parameter μ can be found conveniently by a slight modification of Gee's (10) method. The stress-strain relation for a swollen rubber is

$$F/A = \nu' RT v_r^{1/3} \left(\alpha - \frac{1}{\alpha^2}\right) \qquad (4)$$

where F *is the force of retraction at extension ratio* α, A *is the cross-sectional area of the swollen specimen,* R *is the gas constant,* and T *is the absolute temperature.* Solving Equations 2 and 4 simultaneously yields the desired solubility parameter μ. This parameter is, in general, a function of concentration, i.e., v_r. For good solvents the variation of μ with concentration is slight, but for poor solvents it is appreciable. For all rubber-

[2]Numbers in parentheses refer to Bibliography items at end of this article.

solvent pairs studied here, the relation could be represented by a linear function of v_r (Table 1)

$$\mu = \mu_0 + \beta v_r \qquad (5)$$

where β *is a constant characteristic of the rubber-solvent system.*

The last column of Table 1 allows a comparison with literature values derived from colligative properties of polymer solutions. Since these values were determined in dilute solutions, the comparison should be with μ_0. The agreement must be regarded as good particularly since not all of the polymers are exactly the same. The μ for the system natural rubber-benzene increases slightly with v_r, but the vapor pressure measurements of Gee (11) showed it to be independent of concentration. It must be remembered, however, that the cross-linked rubbers used in this determination contain increasing amounts of combined sulfur, the tendency of which could be to raise μ in hydrocarbon solvents because of a slight increase in cohesive energy density of the network over the unvulcanized, linear polymer.

To determine v for a filler-reinforced stock, v_r is calculated from the swelling data on the assumption that the filler does not swell. The resulting value of v_r is then substituted in Equation 1 or 3, using the value of μ given by Equation 5. This procedure assumes that μ will not be affected by the filler. In view of the short range of molecular forces this assumption does not appear unreasonable. A simple calculation shows that with a filler of 25 millimicrons diameter at a loading of 20 volume per cent., only 6.5% of the polymer is situated within a 10 Å layer of the filler surface. Therefore the effect on solubility must be relatively small. What effect there might be will, of course, be absorbed in the value calculated for v.

Experimental Details

Swelling Measurements

Samples of vulcanized rubber weighing approximately 1.5 grams were cut from regular tensile slabs, weighed on an analytical balance, and allowed to swell in 100 milliliters of the desired solvent for six days at 30° C. (See section on standardization of procedure). As a precaution against oxidation, 0.2% of phenyl-β-naphthylamine was added to the solvent. The swollen specimens were blotted with filter paper and transferred quickly to tared weighing bottles. The volume of imbibed solvent was obtained by dividing the difference between the weight of the swollen sample and the weight of the dry, extracted sample (dried 16 hours at 70° C. *in vacuo*) by the density of the solvent. Next the dry samples were weighed in methanol, and their volume calculated. From this volume was subtracted the volume of fillers (calculated from the recipe and original sample weight) giving the volume of rubber. The latter was used to calculate the volume fraction of rubber in the swollen polymer (v_r).

All solvents employed were either reagent grade or Phillips pure grade (minimum 99 mol per cent. purity).

[4] Instron Engineering Corp., Quincy, Mass.

TABLE 1. SOLUBILITY PARAMETERS

Rubber	Solvent	Temp., °C	μ_0	β	Literature μ
Styrene-butadiene-rubber (SBR)[1] (cold rubber, 23.5% bound styrene)	*n*-heptane	30	0.47	0.39	—
	benzene	30	0.37	0.27	0.37[a]
Hevea (#1 RSS)	*n*-heptane	30	0.46	0.20	—
	toluene	30	0.43	0.05	0.41[b], 0.43[c]
	benzene	25	0.44	0.18	0.44[d]
Butyl (Enjay Butyl 217)	*n*-heptane	30	0.46	0.26	—
	benzene	25	0.51	0.35	0.50[d]
	cyclohexane	25	0.44	0.17	0.43[e]
Butadiene-2-methyl-5-vinylpyridine copolymer,[2] sulfur cured	benzene	30	0.41	0.10	—
Butadiene-2-methyl-5-vinylpyridine copolymer,[2] benzotrichloride cured	benzene	30	0.42	0.54	—

[1] Philprene 1500 (registered trade mark of Phillips Petroleum Co.).
[2] Philprene VP-25.
[a] At 25° C. B. H. Zimm, I. Myerson, **J. Am. Chem. Soc.**, 68, 911 (1946).
[b] W. C. Carter, R. L. Scott, M. Magat, **Ibid.**, 68, 1480 (1946).
[c] M. L. Huggins, **Ann. N. Y. Acad. Sci.**, 44, 431 (1943).
[d] Polyisobutylene: P. J. Flory, **J. Am. Chem. Soc.**, 65, 375 (1943).

Modulus Determinations on Swollen Gum Stocks

The procedure employed in determining the values of the solubility parameter μ was as follows. A set of gum stocks of variable degree of cure was prepared, and samples were analyzed for swelling volume, as described above. In addition, regular dumbbell tensile specimens were swelled to their equilibrium value. The swollen dumbbells were prestretched to 150% elongation on an Instron[3] tester, and a stress-strain curve was determined at decreasing elongations, using a crosshead speed of five inches per minute. The force of retraction at 50% elongation was used in the calculation of μ from Equations 2 and 4.

As a result of the combination of swelling and prestretching, this procedure gives a modulus very nearly an equilibrium value. Because of the low temperature and short duration of the experiment, chemo-rheological effects are absent. Hysteresis effects are nevertheless small, and there is essentially no permanent set. Unless extremely volatile solvents are used, evaporation of solvent from the specimen during the test is not a serious problem. Errors introduced from this source are inappreciable because of the slow (cube root) dependence of the retractive force on swelling volume.

Compounding Recipes

Space does not permit listing all the recipes for the stocks employed in this study. The most important ones are listed in Table 2. Gum stock formulations designed for determinations of μ values were kept as simple as possible with neither softeners nor additional antioxidant employed. The carbon blacks were from the identical lots used in earlier studies (12, 13); a summary of their physical and chemical properties is shown in Table 3.

TABLE 2. COMPOUNDING RECIPES[1]

	A	B	C	D	E	F	G	H	I	J	K	L
Cold styrene-butadiene rubber (SBR) (23.5% bound styrene)[2]	100	100	100	—	100	—	—	100	100	100	—	—
#1 RSS	—	—	—	—	—	100	—	—	—	—	—	—
Butyl rubber[3]	—	—	—	—	—	—	100	—	—	—	—	—
Butadiene-2-methyl-5-vinyl-pyridine copolymer (75/25), 41° F., ML-4, 50[4]	—	—	—	—	—	—	—	—	—	—	100	100
Other polymer	—	—	—	V	—	—	—	—	—	—	—	—
HAF carbon black[5]	—	50	50	V	—	—	—	—	50	50	—	—
SAF carbon black[6]	42	—	—	—	—	—	—	—	—	—	50	50
Other carbon black	—	—	—	—	V	V	V	—	—	—	—	—
Hydrated silica pigment[7]	—	—	—	—	—	—	—	50	—	—	—	—
Highly aromatic petroleum oil[8]	—	—	—	V	—	—	—	—	—	—	—	—
Naphthenic oil and asphaltic flux product[9]	4	5	—	—	—	—	—	—	—	—	—	—
Zinc oxide	3	3	3	3	3	4	5	5	—	—	5	5
Stearic acid	2	1	1	1	—	3	1	2	—	—	—	—
Sulfur	V	1.75	1.75	2.25	1.75	2	2	V	—	—	1.75	—
N-cyclohexyl-2-benzothiazole sulfenamide[10]	V	—	1.0	1.25	1.10	0.5	—	V	—	—	—	—
Tetra methyl thiuram disulfide[11]	—	—	—	—	—	—	1	—	—	—	—	—
Mercaptobenzothiazole[12]	—	—	—	—	—	—	1	—	—	—	—	—
Tert-butyl-sulfenyl dimethyl dithiocarbamate[13]	—	—	—	—	—	—	—	—	—	—	0.65	—
Other accelerator	—	V	—	—	—	—	—	—	—	—	—	—
Dicumyl peroxide	—	—	—	—	—	—	—	—	V	—	—	—
Benzotrichloride	—	—	—	—	—	—	—	—	—	—	—	20
Diarylamine-ketone reaction product 65%, N,N'-diphenyl-p-phenylene-diamine 35%[14]	1	1	1	1	—	—	—	—	—	—	—	—
Phenyl-beta-naphthylamine	—	—	—	—	—	—	—	1.5	—	—	—	—

[1]Entries termed V (variable) are as indicated in text. Gum stocks referred to in text are identical with recipes as shown except for omission of reinforcing agent.
[2]Philprene 1500.
[3]Enjay Butyl 217 (Enjay Co., Inc., New York, N. Y.).
[4]Philprene VP-25.
[5]Philblack O (registered trade mark of Phillips Chemical Co., Akron, O.).
[6]Philblack E (registered trade mark of Phillips Chemical Co.).
[7]Hi-Sil 101 (Columbia-Southern Chemical Corp., Pittsburgh, Pa.).
[8]Philrich 5 (registered trade mark of Phillips Chemical Co.).
[9]Circo-Para (50 parts Circosol 2XH, Sun Oil Co., Philadelphia, Pa.; 50 parts Paraflux 2016, C. P. Hall Co., Akron).
[10]Santocure (Monsanto Chemical Co., Akron).
[11]Tuads (R. T. Vanderbilt Co., Inc., New York).
[12]Captax (R. T. Vanderbilt Co., Inc.).
[13]Philcure 113 (registered trade mark Phillips Petroleum Co.).
[14]Flexamine (Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.).

TABLE 3. CARBON BLACK PROPERTIES

		Surface Area (Sq. M/G)			Ultimate Analysis, %				
Name	Type	BET[6]	Electron Microscope	Oil Absorption, Cc/G	C	H	O	S	Ash
P-33[1]	FT	13.7	17	0.56	99.22	0.48	0.24	0.00	0.06
Gastex[2]	SRF	27.6	35	0.81	97.52	0.32	0.42	0.09	1.65
Philblack A[3]	FEF	45.6	65	1.17	98.44	0.32	0.38	0.68	0.18
Philblack O[3]	HAF	75.1	94	1.14	98.22	0.30	0.83	0.41	0.24
Philblack E[3]	SAF	142.6	138	1.28	97.31	0.33	1.69	0.43	0.24
Acetylene	—	58.0	65	2.40	99.78	0.07	0.07	0.03	0.05
Wyex[4]	EPC	114.2	89	1.13	95.84	0.71	3.40	0.02	0.03
Graphon[5]	C	93.7	113	1.13	98.47	0.02	0.12	0.02	1.37

[1]R. T. Vanderbilt Co., Inc.
[2]General Atlas Division, Cabot Carbon Co., Pampa, Tex.
[3]Phillips Chemical Co.
[4]J. M. Huber Corp., New York.
[5]Godfrey L. Cabot, Inc., Boston, Mass.
[6]Brunauer, Emmett, and Teller method.

Physical Testing

The following standard test procedures were employed in the determination of vulcanizate physical properties:

(a) *Abrasion Loss:* Goodyear-Huber angle abrader, wheel angle 15 degrees. Results expressed in grams loss. Alternate method: National Bureau of Standards abrader with No. 2½ Garnet paper. Specimens for NBS abrasions were extracted with the azeotropic mixture of ethanol and toluene. Results expressed in revolutions per mil abraded. (ASTM D394-47).[4]

(b) *Resilience:* Yerzley oscillograph. (ASTM D945-55 with slightly modified specimen).[4]

(c) *Heat Buildup:* Goodrich flexometer; results expressed in degrees F. (ASTM D623-52T, Method A; 143 psi., 0.175-inch stroke, 100° F. oven).[4]

(d) *Flex Life:* De Mattia; results in multiples of 1,000 cycles to failure at 210° F. (Similar to ASTM D813-52T.)[4]

Development of a Standard Set of Test Conditions

Choice of Solvent

According to the theory, the number of effective network chains calculated by Equations 1 or 3 should be independent of the solvent provided the values of the solubility parameter appropriate to each solvent and

[4]American Society for Testing Materials, 1916 Race St., Philadelphia, Pa.

v_r have been used. Table 4 shows a test of this hypothesis, using a series of cold rubber stocks reinforced by various carbon blacks.

TABLE 4. DENSITY OF NETWORK CHAINS CALCULATED FROM SWELLING DATA IN BENZENE AND *n*-HEPTANE[1]

	Benzene		*n*-Heptane	
Black	v_r	$v \times 10^4$, Moles/Cc	v_r	$v \times 10^4$, Moles/Cc
P-33 (FT)	0.177	1.12	0.399	1.31
Gastex (SRF)	0.204	1.49	0.413	1.50
Philblack A (FEF)	0.221	1.74	0.425	1.60
Philblack O (HAF)	0.217	1.67	0.417	1.56
Philblack E (SAF)	0.222	1.76	0.430	1.76
Wyex (EPC)	0.199	1.41	0.424	1.67
Acetylene	0.225	1.80	0.441	1.93
Graphon (C)	0.175	1.09	0.396	1.27

[1] Cold SBR (Philprene 1500) stocks containing 50 phr of indicated carbon black (Recipe E). Cured 45 minutes at 307° F.

The agreement between results obtained in benzene and *n*-heptane is good considering the large disparity in solvent power as indicated by the marked differences in the swelling values (v_r). In spite of the fact that benzene is the better solvent for most rubbers (particularly SBR), *n*-heptane was selected as the standard in this investigation. The reason for this choice was that excessive swelling, such as might be obtained on lightly cured stocks in benzene, is not desirable from the practical viewpoint of handling the samples. With *n*-heptane the swelling volume for most useful vulcanizates of SBR, *Hevea*, or butyl rubbers will usually fall into the range of v_r from 0.25 to 0.50. There is, of course, no basic objection to the use of benzene or any other non-polar solvent of reasonably good solvent power. Unless specifically indicated, all swelling values reported in this paper are for *n*-heptane at 30° C.

Degradation of Polymer during Test

Inspection of Table 4 reveals values of v obtained from swelling data in *n*-heptane to be slightly larger on the average than those calculated from benzene data. Barring deviations from the theory, this would suggest the possibility of degradation of the rubber in the better solvent or perhaps an increased tendency toward disentanglement of free chain ends. To determine if degradation by chain scission was involved, samples of SBR gum and black vulcanizates were first swollen in benzene for six days, dried, and subsequently swelled in *n*-heptane for six days. The results were compared with those obtained from simple swelling measurement in *n*-heptane:

	v_r (*n*-Heptane)	
	Preswelled in Benzene	Not Preswelled
Gum stock	0.372	0.373
Black stock	0.404	0.404

There is no evidence of degradation, and the small differences in the values of v obtained in the two solvents must be explained by deviations from theory or more nearly complete disentanglement of chain ends in benzene, the better solvent. Entanglements trapped between cross-links should have essentially the same effect in either solvent and would be counted as true cross-linkages.

Choice of Swelling Time

A swelling time of six days was chosen on the basis of test results on several samples which showed no significant changes after four days of immersion in *n*-heptane. In some instances an apparent equilibrium v_r was reached in about two days, but the amount of extractable matter removed from the sample was short of its equilibrium value.

The results quoted in Table 5 are for a SBR-HAF black (Philprene 1500-Philblack O) tread stock (Recipe C, Table 2) of 25-mil sample thickness; with thicker specimens the approach to equilibrium would, of course, be slower. Procedures for hastening the attainment of equilibrium were also investigated. It was found that quite reliable 30° C. values can be obtained by swelling the samples for two hours at 60° C. followed by three hours at 30° C.

Results and Discussion

Effects of Sulfur and Accelerator Level on Cross-Linking at Fixed Black Loading

Carbon blacks are often considered to "activate the cure" of elastomeric compounds. The mechanism of this action is not clear, and it is not known to what extent adsorption of polymer chains or segments on the filler surface contributes fixed points to the network which will act very much like cross-links. The latter type of linkage, which is intimately connected with the effect of reinforcement, might be expected to influence the physical properties of the stock in a manner different from the polymer-to-polymer linkage of vulcanization. As already mentioned, when the number of network chains in a black stock is determined from swelling data, the result will include the contribution of all types of linkages and will, in fact, represent the number of effective network chains in an equivalent network of tetrafunctional cross-links.

It turns out that at fixed carbon black type and loading almost all important vulcanizate properties with the exception of tensile strength, which is sensitive to the sulfur level, depend in the first approximation on this quantity. They are independent of the manner in which the particular number of effective cross-links is introduced, whether through variations in sulfur level.

TABLE 5. EFFECT OF TIME ON SWELLING IN *n*-HEPTANE AT 30° C.

	Hours Immersion in *n*-Heptane								
	2	4	8	16	24	48	96	120	144
v_r	0.427	0.426	0.422	0.421	0.419	0.419	0.423	0.4235	0.4235
% Extracted	4.3	4.9	5.1	5.6	5.7	6.1	6.4	6.5	6.5

TABLE 6. CROSS-LINKING AS A FUNCTION OF CURATIVE LEVEL IN SBR[1]—SAF BLACK[2] STOCKS[3]

Stock	Sulfur, Phr	N-Cyclohexyl-2-Benzothiazole Sulfenamide,[4] Phr	V_r Cure Time, Minutes					$\nu \times 10^4$, Moles/Cc Cure Time, Minutes				
			10	20	30	45	75	10	20	30	45	75
Black	1.25	0.75	0.193	0.311	0.350	0.371	0.388	0.16	0.55	0.83	1.01	1.18
	1.25	1.00	0.235	0.357	0.383	0.398	0.401	0.25	0.89	1.12	1.30	1.34
	1.25	1.25	0.301	0.383	0.403	0.406	0.406	0.49	1.13	1.36	1.40	1.40
	1.25	1.50	0.335	0.398	0.411	0.411	0.409	0.71	1.30	1.47	1.47	1.45
Black	1.50	0.75	0.193	0.341	0.378	0.398	0.409	0.16	0.75	1.07	1.29	1.44
	1.50	1.00	0.275	0.381	0.403	0.415	0.417	0.38	1.11	1.36	1.54	1.56
	1.50	1.25	0.333	0.404	0.419	0.423	0.424	0.69	1.38	1.60	1.66	1.67
Black	1.75	0.75	0.237	0.359	0.397	0.413	0.426	0.26	0.90	1.29	1.50	1.71
	1.75	1.00	0.309	0.399	0.426	0.431	0.435	0.53	1.30	1.71	1.78	1.85
	1.75	1.25	0.356	0.425	0.438	0.439	0.441	0.88	1.68	1.89	1.91	1.94
Black	2.25	0.50	0.209	0.319	0.378	0.409	0.440	0.18	0.59	1.07	1.45	1.93
	2.25	0.75	0.278	0.391	0.427	0.445	0.455	0.38	1.21	1.71	2.01	2.22
	2.25	1.00	0.335	0.432	0.453	0.458	0.463	0.70	1.80	2.15	2.28	2.38
	2.25	1.25	0.372	0.447	0.459	0.468	0.467	1.02	2.03	2.29	2.49	2.48
Gum	1.25	1.25	—	0.351	0.369	0.369	0.370	—	0.83	0.99	0.99	0.99
	1.50	1.25	—	0.377	0.390	0.390	0.391	—	1.06	1.20	1.20	1.21
	1.75	1.25	—	0.390	0.405	0.406	0.405	—	1.20	1.39	1.40	1.38
	2.25	1.25	—	0.417	0.428	0.429	0.430	—	1.56	1.73	1.75	1.77

[1]Philprene 1500.
[2]Philblack E, 42 phr.
[3]Recipe A, Table 2.
[4]Santocure.

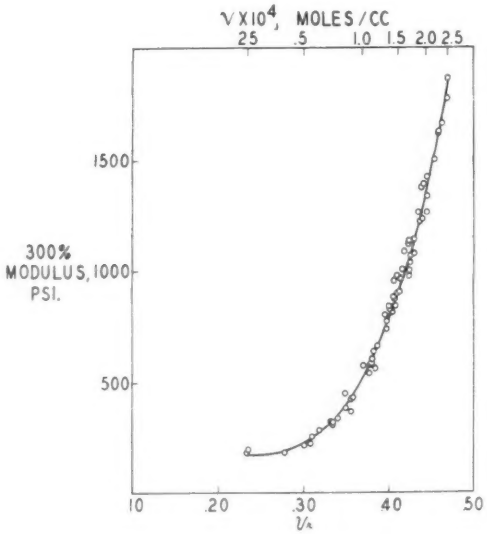

Fig. 1. 300% Modulus vs. density of network chains for a cold SBR-SAF black stock

accelerator level, or cure time. These observations are illustrated in Table 6 and Figures 1 to 3 on a series of cold rubber stocks containing 42 phr of SAF black.

It is interesting to consider the magnitude of the apparent carbon black contribution to cross-linking and the rate at which it is developed during the cure (Table 7). The results indicate that the black contribution is proportional to the total number of network chains once the cure has leveled out and that, at least in the present example, it is developed at nearly the same rate as the vulcanization in absence of black. This, however, might not be the case with a slower accelerator.

Another point of interest is the apparent efficiency of the vulcanization reaction (Table 8). Because of the

TABLE 7. APPARENT BLACK CONTRIBUTION IN COLD SBR[1]—SAF BLACK[2] STOCKS[3]

Sulfur, Phr	N-Cyclohexyl-2-Benzothiazole Sulfenamide,[4] Phr	ν Black ν Gum at Indicated Cure Time, Min.			
		20	30	45	75
1.25	1.25	1.36	1.37	1.41	1.41
1.50	1.25	1.30	1.33	1.38	1.38
1.75	1.25	1.40	1.36	1.36	1.41
2.25	1.25	1.30	1.32	1.42	1.41

[1]Philprene 1500.
[2]Philblack E.
[3]Recipe A, Table 2.
[4]Santocure.

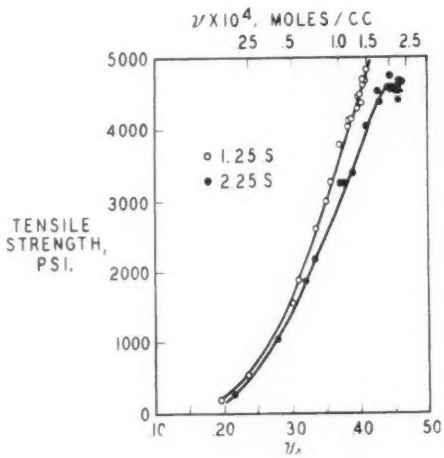

Fig. 2. Tensile strength vs. density of network chains for a cold SBR-SAF black stock

filler contribution this efficiency will be about 40% higher in the black stocks if equivalent amounts of sulfur have reacted. The results of free sulfur determinations show the expected trend. When black stocks are overcured, some sulfur is split out, but no loss in apparent

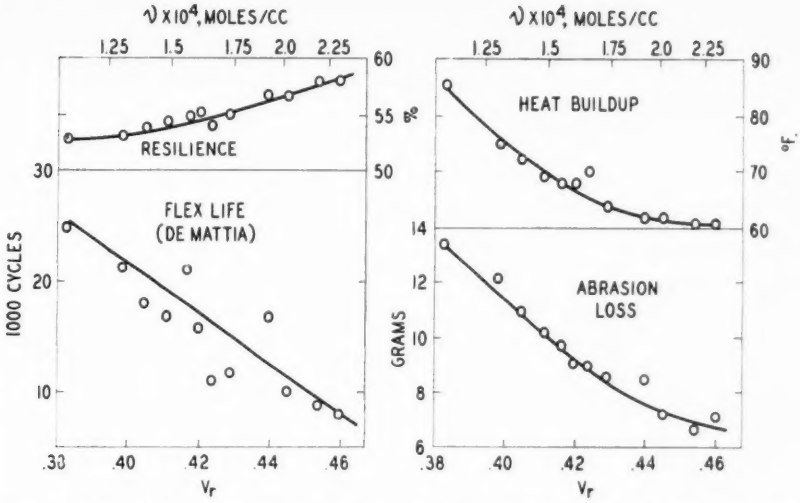

Fig. 3. Dependence of resilience, flex life, heat buildup, and abrasion loss on density of network chains for a cold SBR-SAF black stock

TABLE 8. COMBINED SULFUR IN COLD SBR[1]—SAF BLACK[2] STOCKS

Stock	Sulfur, Phr	N-Cyclohexyl-2-Benzothiazole-Sulfenamide,[4] Phr	Cure Time, Min.	Fraction of Total Sulfur Combined[5]	$\nu \times 10^4$, Moles/Cc	$[S]/\nu$[6]
Gum	1.75	1.25	20	0.89	1.20	3.8
			30	0.94	1.39	3.4
			45	0.97	1.40	3.6
			75	0.97	1.38	3.6
Black	1.75	1.25	10	0.73	0.88	4.3
			20	0.83	1.68	2.5
			30	0.91	1.89	2.5
			45	0.89	1.91	2.4
			75	0.78	1.94	2.1
Gum	1.25	1.25	75	0.95	0.99	3.5
	1.50			0.95	1.21	3.4
	1.75			0.97	1.38	3.6
	2.25			0.98	1.77	3.6
Black	1.25	1.25	75	0.88	1.40	2.3
	1.50			0.79	1.67	2.1
	1.75			0.78	1.94	2.1
	2.25			0.97	2.48	2.6

[1]Philprene 1500.
[2]Philblack E.
[3]Recipe A, Table 2.
[4]Santocure.
[5]Calculated from free sulfur analyses, method of Oldham, Baker and Craytor (16).
[6][S] = Combined sulfur in gram atoms per cc. of polymer.

cross-linking results. It also appears that the sulfur reacting in the early stages of vulcanization is utilized somewhat less efficiently.

The results of gum vulcanizates agree closely with those of Scott and Magat (14) who found a ratio of $[S]/\gamma$ of approximately four. Since γ is related to the number of cross-links n by

$$\nu = 2n - \frac{2\rho}{M} \qquad (6)$$

where ρ *is the density,* and M *is the primary molecular weight of the polymer,* roughly seven to eight sulfur atoms are required for the formation of each cross-link (omitting the relatively small term $2\rho/M$ from consideration). This fact, however, does not mean that the cross-linkage itself contains that many sulfur atoms. Recent work indicates this number to be probably no larger than two (15). The remaining sulfur combines to form zinc sulfide, and some undoubtedly forms intramolecular loops which are not counted in the determination of ν by swelling.

When scission effects accompany the processing or vulcanization of a polymer (breakdown, reversion), the end result will be the same as a reduction in primary molecular weight. If these effects are pronounced, the term $2\rho/M$ in Equation 6 may become appreciable. The quantity ν is then no longer unique, and significant differences in physical properties at equal ν may appear. Even in this instance, however, the number of network chains should be a better criterion of the overall degree of cure than the number of cross-links alone.

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(To be concluded)

Banbury Automation at Holtite Mfg. Co.

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The Banbury mixing unit at Holtite Mfg. Co., which handles compounds ranging from highly plasticized sponge rubber formulations to extremely tough and heavily loaded soling composition, has been made essentially automatic, with the resultant increase in production and lowering of manufacturing costs.

Ingredients are automatically charged into the Banbury mixer; the mixed stock passes to an extruder controlled to match the speed of the Banbury, then to a cooling train synchronized with the speed of the extruder, and finally to an automatic cutter and stacker and stock removal system—a continuous, automatic production line—automation.

IN THOSE segments of the rubber industry where mass production of relatively few items prevails, automatic production techniques are ideally adaptable. In recent years many plants have taken steps in the direction of automation, although many operations have been developed to a semi-automatic stage only.

Evolution of an Automated System

The ideally automated unit would be one where, during a complete processing cycle, the human element would be used to supervise and observe, to adjust controls where necessary, and to intervene only when electrical or mechanical failure takes place. In other words, a premium is placed on intelligence and training, rather than on brawn, to obtain a greater productivity at speeds otherwise beyond normal and sustained human operating effort.

At the Holtite Mfg. Co., Baltimore, Md., manufacturer of "Cat's Paw" heels and soles, it is possible to trace the evolution of an automated system applied to a manufacturing stage generally encountered in the rubber industry, that is, Banbury mixing. This development is of particular interest because it emphasizes the difficulties encountered when a program of this type must be made to work in the face of serious practical limitations. As a result, ideal solutions to the problem,

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which are possible if ideal conditions of operation exist, must be modified to suit the actual conditions of operation in the plant.

The Conditions

From the beginning management at Holtite made the following stipulations for the new mixing unit:

(1) The rate of production must be at least twice as much as that obtained from a conventional unit of the same size.

(2) The unit must handle all the formulations of the plant, with a plasticity range from highly plasticized sponge formulations to extremely tough and heavily loaded soling compositions, and all colors from white to black.

(3) The complete unit, including loading and take-away facilities, must be located in a space approximately 80 feet square and two stories high.

(4) Such operations as loading materials into the mixer, discharge, recycling, take-away, cooling, cutting, and stocking must be made automatic.

The High Horsepower Banbury

With the development of the Uni-Drive[1] for the Banbury[1] mixer, permitting the use of drive horsepowers far in excess of previous types, Holtite decided to install a high-speed, high-pressure #11 unit, with rotor speeds of 60 and 30 rpm., and driven by a 1500/750 hp. induction motor. The high-pressure unit has a 20-inch diameter ram operating at pressures up to 200 psi., compared to the conventional eight-inch diameter ram operating, usually, at 80 psi.

Pilot-plant tests made at Farrel-Birmingham Co.'s laboratory had indicated that batches could be mixed in one to 1½ minutes of actual mixing time for batches which were taking from six to nine minutes' actual mixing time in a conventional Banbury with normal pressure and 20 rpm. rotor speed. It was decided that the Banbury would operate on an average three-minute mixing cycle, including loading and unloading of the unit. Thus productivity would average 20 batches per hour. In actual operation, this productivity has been exceeded.

Compounding and Loading

From the outset Holtite was interested in the possibilities of using an automatic compounding system. Such methods are not new, and have been developed successfully by such companies as Richardson Scale Co., Clifton, N. J.

A careful study of these systems indicated, however, that anyone attempting to put the entire range of colors from black to white through one system would run into serious, if not insuperable, problems of color contamination from one type of batch to another. Moreover, in order that all the materials in the formulation be handled by an automatic weighing system, materials such as rubber, reclaims, masterbatches, etc., must be produced in pelletized form.

Until a more workable system could be developed, Holtite decided to stay with conventional compounding methods involving bin storage systems and moving scales allowing the compounder to pick up his materials from bin to bin. Because of the high rate of production, the actual compounding of the formulations is split up into segments sufficiently small to permit the compounder to keep up with the mixing unit. Thus a number of small units in tote tubs proceed to a consolidating center where the entire batch is brought together into one tub. Once the main tub leaves the consolidating center it goes to a storage line and enters the area where the batch goes under automatic control until it is finally through the complete system.

The Loading System

The technique used by Holtite for loading the batch into the mixer is the so-called one-shot dump. The complete batch, with the exception of oils and readily meltable solids, is in the main tub. Oils and readily meltable solids (such as stearic acid and petrolatum) are automatically weighed and injected into the mixer through a system developed by Tey Mfg. Co., Milford, Conn.

The main tub of materials, on an appropriate signal from the cycle controls, moves into position in a cage which turns the tub 180 degrees to an upside-down position, then returns to its former position, and moves out of the cage and back to the consolidating center.

Loading time is one of the most critical in the operation. Where a batch is going to be mixed in 1½-2 minutes, loading time, even when only a matter of a few seconds, becomes an appreciable percentage of the overall mixing cycle. Therefore anything done to speed up loading time pays dividends in greater overall productivity. Rapid loading, however, causes serious problems of choking up of materials at the Banbury mixer hopper. Holtite has experimented with several methods to achieve efficient loading. The latest, and what gives promise of being a very successful, method involves changing the plunger layout on the Banbury mixer so that it travels high enough out of the way when it is raised to expose the entire opening of the Banbury. The area above the hopper is enclosed in a chute rising at a steep angle to the cage where the main tub is upended and dumped. This system was developed by Standard Conveyor Co., North St. Paul, Minn.

The Banbury Controls

As pointed out above, once the main tub leaves the consolidating center, it enters the area of automatic control. At the Banbury mixer there are two major control instruments. One is a Bristol[2] cycle timer which has timing disks that can be notched to give a large number of impulses representing sequential operations. At the end of a timing cycle the timer automatically resets to zero. The other instrument is a Leeds & Northrup[3] recording thermocouple of a special type. In addition to recording the temperature, this thermocouple has a sliding element which can be preset to any desired

[1]Farrel-Birmingham Co., Ansonia, Conn.
[2]Bristol Co., Waterbury, Conn.
[3]Leeds & Northrup Co., Philadelphia, Pa.

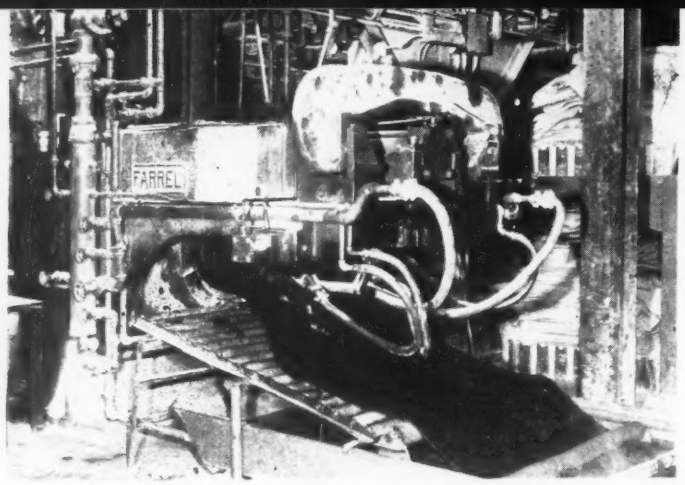

Fig. 1. Special extruder used for automatically handling discharge from Banbury mixer. Extruder produces 16-inch tube which is split into a 48-inch wide sheet at speeds up to 30 feet per minute

Fig. 2. Adjustable voltage sealed-ignitron mercury-arc rectifier with G-E Amplistat control for 500-hp. extruder motor

temperature. Thus as the temperature rises in the Banbury during mixing, the temperature indicator moves until it makes contact with the preset temperature control point. At this point an electrical impulse takes place, which is used to control all the operations on the mixer.

All batches are mixed to predetermined temperatures. When this temperature is reached, the electrical impulse takes over the timer and sets it in operation. The notches in the timer control the opening and closing of the hopper door, the opening and closing of the gate, the raising and lowering of the plunger, the injection of liquids, and the positioning and dumping of the compounds into the mixer. When the timer performs its sequence of operations, it returns to zero and stays there until the temperature impulse starts it up. The first notch on the timer, therefore, controls the opening of the Banbury gate and the discharge of the batch.

Owing to variations in the plasticity of batch ingredients such as rubber, reclaim, masterbatches, etc., as well as changes in cooling water temperatures and the efficiency of heat transfer to the coolant, the setting up of predetermined temperature constants as the major control in batch mixing causes time to become a variable factor. Batches are mixed to temperature rather than to time for two major reasons: (1) Many batches contain both accelerators and the sulfur and must be carefully controlled temperature-wise to avoid scorching. (2) A subsequent extrusion operation following dumping of the batch from the Banbury is very difficult to control without careful temperature regulation.

Mixer Take-Away Operation

It was decided immediately that placing a conventional 84-inch mill under the Banbury mixer would be unworkable because of the high speed of production, and that even if means were found to get the batch off the mill quickly, the procedure would not lend itself to a fully automatic, synchronized take-away system in which time is a variable.

A special type of Farrel-Birmingham extruder was installed under the mixer. This extruder shown in Figure 1, produces a tubular cylinder of rubber approximately 16 inches in diameter, which is split into a sheet approximately 48 inches wide and which leaves the extruder at a maximum speed of 30 feet per minute.

The speed of the extruder is adjustable. At the beginning of a run, the normal speed of the extruder is set by the operator so that it runs just fast enough to take care of the mixed stock as it drops from the Banbury. To prevent overfilling or starving of the hopper due to variations in time of mixing, the hopper of the extruder is equipped with photoelectric limit switches to detect "full" and "empty" conditions. When the "full" limit switch is activated, it sends the extruder into fast speed until the level of the hopper is lowered. When the "empty" limit switch is activated, indicating the lowest safe level of stock in the extruder without starving the screw, it stops the extruder, which then starts up automatically when the next batch arrives.

The extruder is driven by a 500 hp DC motor with an adjustable voltage sealed-ignitron mercury-arc rectifier with Amplistat[1] control, shown in Figure. 2. This type of drive offers the maximum in flexibility and ease of operation to meet the severe operating requirements. The motor is capable of operating over a wide speed range with a constant torque output. The mercury-arc rectifier power supply provides a packaged equipment with a relatively small floor-space requirement, high efficiency, and low maintenance. Operating experience with this unit has been excellent.

The Cooling Train

In this installation, because of the severe limitations of space, cooling of the high volume of production of mixed stock from the Banbury mixer and take-away extruder became the major problem. Where plenty of space is available, cooling of the stock is not a serious problem. It is advisable, however, where there is ample space not to squeeze the equipment required for cooling the stock into a space which will make the operation unnecessarily more costly and more difficult.

The cooling train at Holtite is actually about 35 feet long and 11 feet high. It was developed to the com-

[1]General Electric Co., Schenectady, N. Y.

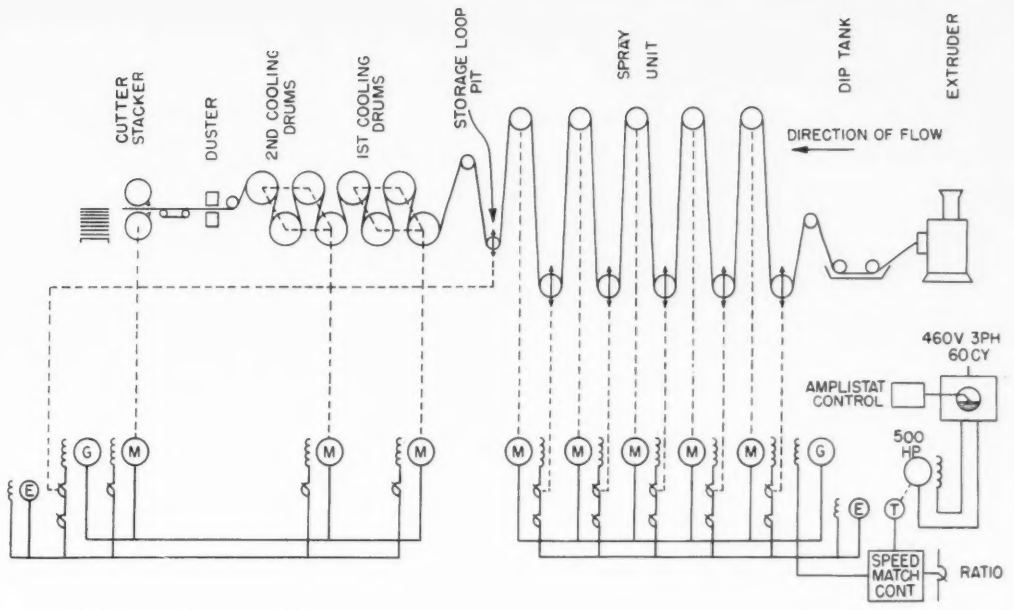

Fig. 3. Schematic diagram of extruder and cooling train including wiring diagrams for extruder and cooling train rolls, drums, and cutting stacker

pany's requirements and specifications by Mayer Refrigeration Engineers, Rutherford, N. J., in cooperation with General Electric, who assumed overall responsibility for complete synchronism from the extruder through to the end of the operation at the automatic stacking unit.

The cooling train is shown schematically in Figure 3. When the rubber comes out of the extruder, its temperature can vary from 250 to 325° F. It is dropped into a water bath for initial cooling and strengthening of the ribbon of stock and then is taken through a spray unit where it is sprayed with cold water through special nozzles developed by Mayer Refrigeration engineers. The bulk of the heat is taken out of the stock at this point. However, the last 40 or 50 degrees which have to be removed from the stock in order to bring it down to a safe storage temperature are always hard to remove. For this purpose the ribbon of stock then passes over a series of cooling drums refrigerated to 40° F. The ribbon of stock then passes through a Randall Duster[5] and into an automatic cutting and stacking unit designed and built by International Conveyor & Washer Co., Detroit, Mich. The entire unit developed by the latter company is quite ingenious and will be described later.

From the time the rubber is extruded until it is finally cool, the sheet may shrink as much as 50%, which shrinkage presents some problems in handling the sheet in a compact, automatic unit. Most of the shrinkage takes place in the spray cooler. Therefore, to accommodate the difference in sheet speed as it progresses through the loops of the cooler, each of the five top rolls is driven by a separate DC motor. The five bottom rolls are movable and float up and down as they are supported by the sheet. To each floating roll is coupled a mechanism for turning a rheostat which is in the field of the motor driving the top roll. Each bottom roll, therefore, is a "dancer roll," and the rheostats automatically control the speed of the motors driving the top rolls to accommodate the shrinkage of the sheet.

The DC voltage to the cooler motors is supplied by a G-E Speed Variator power unit, shown in Figure 4. The DC voltage is regulated so that it is proportional to extruder speed. Therefore the cooling train will automatically start, stop, and change speed with the extruder. This operation is accomplished by an electronic regulator, which holds the generator voltage to some ratio with the extruder tachometer voltage. The ratio is adjustable by means of a potentiometer on the operator's panel, which allows easy and rapid adjustment of the relative speeds of the cooling train and the extruder.

The Delivery End

The refrigerated cooling drums are in two sections, each driven by a DC motor, in order to compensate for further shrinkage of the sheet as it passes over the refrigerated drums. The cutter and the stacker are also driven by a separate motor, and these three delivery end motors are controlled by a second Speed Variator unit. Between the water spray unit and the refrigerated cooling drums is a looping pit with a floating roll, which has a vertical movement of seven feet, thus providing strip storage of 14 feet, or about 28 seconds of extruded sheet at maximum speed. A dancer-roll rheostat is coupled to this roll, and it is used in the field of the delivery end generator to control the speed of the delivery end.

This electrical setup, along with the looping pit,

[5]Randall Duster Corp., New York, N. Y.

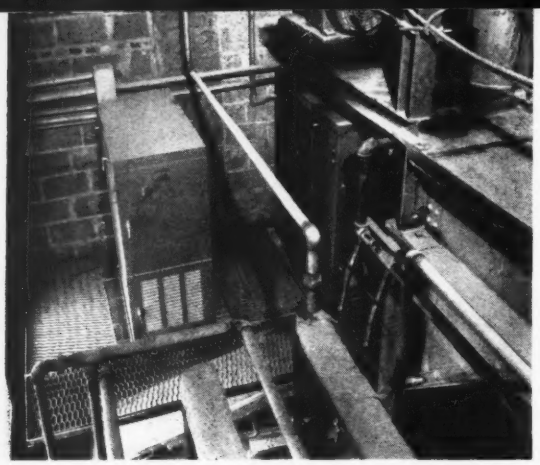

Fig. 4. G-E Speed Variator power units for controlling cooler motors and cutter and stacker motors at entry and delivery ends of cooling train, respectively

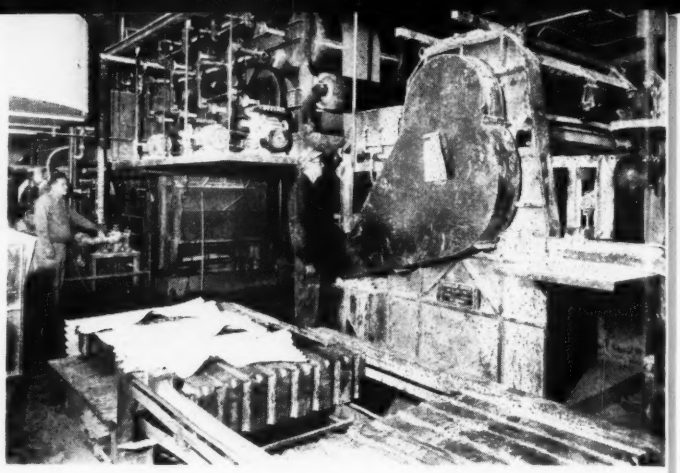

Fig. 5. Part of the delivery end of the cooling train and cutter and stacker showing cutter at the right and empty skid conveyor in the foreground

which is a stock reservoir, permits continuous operation of the extruder and water spray unit, even when the delivery end, including cutter and stacker, shuts down to permit automatic removal of a loaded skid and the positioning of an empty skid. The dancer-roll rheostat mechanism is designed so that the loop is held in the top, or minimum storage position, when the delivery end is running. When the skid on which the sheets are being stacked is full, a limit switch will open to stop the delivery end until the full skid is moved out and an empty skid is moved into place. Then the limit switch will close to start up the delivery end. During the time the delivery end is stopped for the skid change, the entry end continues to run, and the strip accumulates in the storage loop. When the delivery end restarts, it will run at a speed higher than normal until the excess storage is removed from the loop, and the dancer roll approaches the top, where it enters the controlling range to bring the speed back to normal.

The skid conveyors are driven by AC motors and are limit switch controlled to move the empty skids into place and to move the full skids off. The various AC pump motors for the cooling systems are automatically started and stopped with the line. Figure 5 shows part of the delivery end of the line.

Cutting and Stacking

Continuous and automatic stacking of sheets of rubber on to a skid has always been a difficult problem. This procedure is further complicated when operating conditions involve sheets with extreme differences in stiffness. At Holtite this stiffness range varies from well-plasticized crude rubber to sheets as stiff as wooden boards.

The Unit developed by International Conveyor & Washer Co. consists of a rotating double-bladed knife which, for each revolution, cuts two sheets 36 inches long. As the sheet leaves the cutter, it is moved against a limit switch. The sheet at this point is lying on a roller conveyor, and this section of conveyor is mounted on a hydraulic cylinder which permits this section of conveyor to be moved vertically upward. When the sheet hits the limit switch, the conveyor section moves upward and acts as a hammer to nail the sheet of rubber to an overhead plate from which nails protrude. This nail-bearing plate is mounted on tracks and has a reciprocating motion which positions it at one end of the travel over the rising conveyor section, and at the other end directly over a skid. When the nailed sheet of rubber arrives over the skid, a stripper plate removes the rubber and allows it to drop gently on the skid. The nailing plate then automatically returns to pick up another sheet of rubber.

Empty skids are placed on a conveyor and are automatically moved into position when needed. At the skid loading position the skid rests on a hydraulic cylinder, which raises the skid to within a few inches of the nailing plate mechanism, and gradually drops toward the floor, the speed of dropping being adjustable, so that it drops the thickness of one sheet by the time the next sheet arrives. When the skid finally reaches bottom, it activates a limit switch controlling a conveyor which moves the loaded skid away to storage. Meanwhile the empty skid conveyor is automatically activated and moves an empty skid into position.

Summary of Holtite Banbury Automation

Starting with the Banbury, the ingredients are automatically charged, and a continuous, automatic process begins. When the Banbury operation is complete, the process is passed to the extruder. The extruder controls have the intelligence to match its speed with the rate of material coming from the Banbury. The entry section of the cooling train then carries the rubber away at just the proper rate not only to match the incoming speed of the sheet, but also to accommodate external influences (shrinkage) on it. The delivery end functions automatically to package the material in the quantity and form desired, and it is able to accommodate the material being fed to it at different speeds. Thus, what has been evolved is a continuous, automatic production line—the definition of automation.

Conclusions

This Banbury automation unit was installed at Hol-

(Continued on page 83)

Fusion and Adherence of Natural Rubber During Trans-Oceanic Shipment

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"Faulty stowage, leading to contamination of cargoes, distortion and obliteration of bale markings, adds thousands of dollars a year to the cost of natural rubber reaching the United States," according to a recent statement of the Rubber Manufacturers Association.

This article discusses basic causes, analyzes the approaches made, and suggests possible remedies for natural rubber stowage and handling during ocean transport from producer to consumer, based on observations and studies made at the Port of New York and Gulf ports the past several years.

MANUFACTURERS, importers, underwriters, and ocean carriers are becoming increasingly concerned with the problem of fusion of bareback bales of natural rubber and adherence of foreign material to them during ocean transit. Increased supplies of neatly packaged and labeled synthetic rubbers are causing rubber products manufacturers to be reluctant to accept deliveries of natural rubber bales which must be separated and cleaned prior to use. Increased dockside labor rates to discharge fused bales, to identify bales with obliterated marks, and to recondition contaminated bales along with the demand of consumers for delivery of clean, uncontaminated rubber are creating a serious disadvantage for natural rubber in its competition with synthetic rubber for the American market.

Committees from The Rubber Manufacturers Association, Inc., and the Rubber Trade Association of New York studying the problem have reported little progress. As a result, a marine surveying firm, Marine Surveys Co. of New York, has been employed by the New York Committee of Inward Far East Lines to make an extensive investigation of stowage practices and dunnage materials in use by lines discharging rubber at New York and Gulf ports. The New York Committee of Inward Far East Lines launched this project on June 26. Although improved stowage practice and more satisfactory dunnage materials may reduce the problem, these factors alone, however, cannot eliminate it.

The threefold purpose of this article is to discuss basic causes, analyze the approaches made, and suggest possible remedies for natural rubber stowage and handling during ocean transport from producer to consumer. The writer's opinions are based on observations and studies made at the Port of New York and the Gulf ports over the past several years.

Causes of Adherence

Little attention has been given to the causes of fusion and adherence of natural rubber bales under present

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In 1948 he became chief inspector for natural rubber for The B. F. Goodrich Co., at New York, N. Y., and then held the same position with Imperial Commodities Corp., New York, in 1952 and 1953. Since 1953 he has been the Gulf Coast representative of Walter F. Powers, weighers, samplers and rubber inspectors, New York and New Orleans.

Mr. Williams is a member of the New Orleans Traffic Club and the Traffic Club Toastmasters.

Fig. 1. Bales of RSS coated with RMA solution showing embedded dunnage boards and dunnage board impressions in the rubber. The boards pulled free without splinters adhering to the rubber, and despite the fact that these bales were severely crushed in transit, there were no fused bales in this 448-bale lot

methods of handling and stowage for ocean shipment. An understanding of the following facts is essential if the problem is to be solved or reduced to minor importance.

1. Most grades of natural rubber are more or less tacky, i.e., sticky, possibly owing to surface oxidation which may take place during the smoking and/or drying processes during manufacture.

2. The tendency of the surface of rubber bales to oxidize, soften, and become sticky is increased as the temperature of the rubber is increased.

3. The degrading effect of elevated temperatures on rubber is related to time as well as temperature, e.g., rubber exposed to temperatures in the 100° F. range for the five to eight weeks' ocean transit time becomes as tacky as rubber softened at 180° F. for five to eight hours.

4. Large quantities of mechanically generated heat are produced by the forces at work on rubber stored in a ship's hold. Incessant vibrations caused by ship motive power equipment and compressions and decompressions of the rubber bales caused by the rolling, tossing, and pitching motions of the ship result in constant heat generation in the rubber bale due to internal and external friction.

5. Heat thus generated in the rubber must be quickly absorbed by surrounding atmosphere and expelled from the hold by adequate ventilation systems else fusion and adherence of the bales may result.

6. Bale dimensions change under cargo pressure, becoming flattened with corresponding increases in length and width. Adjacent surfaces in the vertical plane become pressed into each other, and friction is intensified. Fusion between bales results.

Methods of Elimination

Three general approaches have been made to eliminate fusion and adhesion:

1. Improved packaging.
2. Use of separators between successive layers of stowed rubber.
3. Improved stowage procedures.

The First Approach—Packaging

The Rubber Manufacturers Association, Inc., New York, N. Y., with the cooperation of the Rubber Trade Association of New York, has made the most effective effort to date to reduce adherence and fusion of bales during transit by developing a bale coating solution which eliminates tackiness of outer bale surfaces.[1] This solution is compatible and readily dispersible in the rubber and does not chafe off, thus making a satisfactory base for shipment marks if approved RMA marking solutions are used. The coating solution makes bale surfaces slippery, reducing heat generated by friction between external bale surfaces. (See Figure 1.)

Fusion and adherence problems do not occur with RMA coated bales unless the rubber was excessively oxidized originally or becomes so through long exposure to elevated temperatures. The RMA does not make mandatory the use of its coating solution on grades other than Ribbed Smoked Sheets, nor do all shippers, however, pack in accordance with RMA specifications.

RMA packaging specifications permit heavy talc dusting as an alternative packing method to eliminate adhesion in transit for all grades other than Ribbed Smoked Sheets. The use of talc is much cheaper than the use of the coating solution. Except for RSS and certain estate produced crepes, very few shipments are coated. It is with the remaining grades—the Browns, Ambers, Smoked Blanket, and Flat Bark—that the adherence and fusion problem is most severe.

Although talc does allay initial tackiness, its inability to prevent fusion and adhesion of the bales during ocean shipment is constantly demonstrated. Some talc falls off prior to ship stowage, and much of the remainder is absorbed by the rubber during transit. When large quantities of talc are used between successive layers of rub-

[1] "Type Description and Packing Specifications for Natural Rubber." RMA and RTANY, New York, N. Y., July, 1952.

Fig. 2. Badly fused lot of Smoked Blankets. Extra labor costs to discharge and recondition this lot exceeded $5,000. An additional $1,500 in damage allowances was paid to the final buyer. This lot had been liberally dusted with talc when stowed

ber during stowage, fusion, although reduced, is not eliminated.

Costly proof of the latter assertion was demonstrated by a ship recently discharged at New Orleans. (See Figures 2 and 3.) Hundreds of pounds of talc had been used between successive layers of rubber during stowage of this shipment in the Far East. Yet ship departure from New Orleans was delayed 15 hours while more than 500 manhours of additional stevedoring and dockside labor were used to discharge and break apart 1,600 bales of fused Smoked Blanket and #3 Amber from a lower hold. Talc alone certainly does not do the job required.

The RMA packing specifications do not require complete rubber wrapping of bales other than for RSS and Thin-Pale Crepes. The writer's observations indicate that less fusion occurs among fully wrapped bales than among bales with edges of blankets exposed. The smoother bale surfaces presented by wrapped bales tend to reduce frictional heat. Further investigation might warrant a packing specification requiring bales of all grades and types to be fully wrapped with rubber.

The Second Approach—Separator Materials

Talc, dunnage boards, treated papers, plastic and semi-plastic films, and, more recently, sheets of plywood have been tried or are currently being used as separator materials between bales with many undesirable results.

Talc

Talc, though more successful than many other materials, does not prevent adherence and fusion, as discussed above. (See Figures 2 and 3.) It is objectionable for other reasons. Talc impregnates and has an abrasive, obliterating effect on bale markings. It contaminates other cargo and fouls the air during handling operations. As a result, most ocean carriers have discontinued using talc during stowage, because labor costs for workers in holds where talc has been used are higher.

Dunnage Boards

Dunnage boards under cargo pressure become so deeply embedded that they fail to maintain the desired separation. The discharged rubber is frequently contaminated with pieces of wood and splinters. (See Figure 2.) Paper, plywood, and film separators form barriers to air circulation and dissipation of frictional heat. Thus heat softening and adhesion are inevitable even though fusion of top and bottom bale surfaces, separated by the dunnage boards, is prevented.

Plastics Films

Paper and wood are incompatible with rubber and must be removed before processing. Some plastic films, such as polyethylene and rubber hydrochloride,[2] however, are compatible and will satisfactorily disperse if processing temperatures are high enough. Unfortunately, the films are noted also for their excellent heat insulating properties. Consequently, every shipment of rubber in which film separators are used contains bales with sticky heat softened edges and adhered pieces of film.

Fig. 3. Dockside labor breaking apart two fused bales of RSS

Since some films are compatible with rubber under certain conditions and are sufficiently inexpensive to permit one-time usage, further experimentation may be indicated. Perhaps the objectionable heat insulating property of the plastic film could be sufficiently reduced through multiple small perforations in the film used as separators between layers of stowed rubber to produce adequate dispersal of mechanically generated heat and still provide desired separation of the rubber bales. Trial shipments using films with various degrees and sizes of perforations would be the best means of determining the matter.

Separator Requirements

Separator materials tried to date have been incapable of repeated usage. Perhaps trial of materials with higher initial cost which could be used repeatedly is indicated. Such material would have to meet the following requirements:

1. Permit free air circulation and heat transfer.
2. Have surfaces with a law coefficient of friction.
3. Be sufficiently strong to withstand forces encountered in transit and the application of power machinery to tear apart the occasionally excessively oxidized bales.
4. Be stowable in minimum space for return voyages.
5. Be priced in line with potential demand.

A strong perforated rubber sheeting material could possibly be designed to meet these requirements. Adhesion of oxidized bales to the rubber sheeting could practically be eliminated if both sides of the material were surfaced or coated with a fluorocarbon type of film.

Experiments with Fluorocarbons

The writer conducted a few experiments to test the non-adhesive possibilities of two fluorocarbon films, Teflon[3] and Kel-F.[4] Strips of each film and a control strip of polyethylene were placed between pieces of sticky, excessively oxidized Flat Bark crepe rubber. Sufficient pressure was then applied with steel plates and C-clamps to squeeze the assemblages to one half their original thicknesses. After seven days' storage at

[2]Pliofilm, chemical division, Goodyear Tire & Rubber Co., Akron, O.
[3]E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
[4]M. W. Kellogg Co., Jersey City, N. J.

Fig. 4. Cargo of crepe rubber stacked "on end" in freighter's hold to prevent fusion of the bales. Note burlap patches on tops of bales. This method of stowage was devised by Isthmian Steamship Lines at the suggestion of the Insurance Co. of North America

room temperature both fluorocarbons readily separated from the rubber although some sticky particles of rubber did adhere to each tape. The polyethylene assemblage could not be separated, having become fused into a single mass.

Despite the very low coefficients of friction and non-adhesive properties of the fluorocarbon films tried, the present high cost and low tear resistance rule out use of these as separators. As suggested above, it may be possible, however, to coat perforated rubber sheeting with fluorocarbons to take advantage of their desirable properties at a lesser overall cost.

Even though a separator material is developed which does not adhere and which prevents fusion between layers of rubber, the problem of fusion between bale edges in the vertical plane still remains. It is impractical to put separator materials completely around each bale. Thus fusion between vertical bale surfaces can be eliminated only through improved stowage practice.

The Third Approach—Improved Stowage

Three special methods of stowage have been tried:

1. Preferential stowage—attempting to give softer grades the advantages of between-deck or top stowage.
2. "On end" stowage[5] of crepe rubber having burlap or cloth markers on bale ends.
3. Spaced stowage—the spacing of bales several inches apart in lower tiers to allow for increases in length and width of bales under cargo pressure.

Preferential stowage, although desirable, can only be used to a very limited extent. Ships loading at several Far Eastern ports in succession must stow rubber as received regardless of its type or grade. First preference must be given to the order in which ports of discharge are scheduled. It obviously would be not feasible to stow soft rubber being shipped to the second or third port of discharge on top of rubber consigned to the first port.

Occasionally, however, situations occur in which mates have an opportunity to give desirable stowage to the softer grades provided they have been trained to recognize the stowage characteristics of these grades.

"On end" stowage is limited since only 15-20% of import rubber has burlap or cloth markers on each bale end. Although some fusion between successive layers may be prevented, the method does not permit spacing between bales and thus does nothing to prevent fusion in the vertical plane. (See Figure 4.) Danger to stevedores from toppling tiers is greatly increased during discharge. Cargo pressure is concentrated on the markers, causing them to become embedded in bale ends. Final buyers object to adhered burlap and usually demand dockside reconditioning. Since removal of adhered markers destroys bale identity, further expense may be expected in order to re-mark the bales.

Spaced stowage is the most effective method tried to date. Bales in the four to six lower tiers are spaced two or more inches apart to allow for the inevitable increase in length and width under cargo pressure. Two- or three-inch spacing is adequate for well-packed bales of RSS. Up to eight-inch spacing is necessary for the more loosely packed RSS and softer crepe grades.

Admittedly, spaced stowage does nothing to prevent fusion between layers, thus the need of satisfactory separators and/or properly wrapped and coated bales continues. Spaced stowage, however, is the only sure means of preventing fusion between bale edges in the vertical stowage plane of the softer grades. Even RMA coating can be absorbed by the softer grades under severe pressure, friction, and temperature conditions. Spaced stowage has additional merit in that it facilitates air circulation and heat removal in the part of a hold where generation of heat mechanically is most intense.

Stowage on Gulf Ships

It has been reported correctly that rubber discharged from ships calling exclusively at Gulf ports is usually in better condition than rubber discharged at East Coast ports. The largest carrier of rubber to the Gulf has been more successful than most lines in reducing the seriousness of the problem.

Mates of this line are experienced in the stowage of rubber, utilizing preferential stowage when possible.

[5]See RUBBER WORLD, p. 583, July, 1956.

Spaced stowage is also practiced. Talc is the only separator material used. Dunnage boards are permitted only where absolutely necessary to brace or level cargo. Thus adherence of foreign materials other than those used in packaging certain lots is almost non-existent. All vessels are equipped wtih "Cargocaire,"[6] an apparatus providing forced ventilation and controlled temperature and humidity, or with other types of forced ventilation systems.

With all these precautions, however, discharges of this line are not so good as is desired. Much extra labor is required to identify, sort, and segregate bales with talc obliterated markings into the respective bill of lading lots. Numerous bales must be thoroughly beaten with paddles to bring out marks. Some bales always remain on which marks have been completely obliterated, thus causing serious delivery problems.

One other line calling exclusively at Gulf ports has excellent outturns with respect to fusion and adherence. It carries only African rubbers. Outturns are good because African sheets and crepes are well coated, because quantities involved are relatively small, and because the vessels are equipped with "Cargocaire." Transit time from African ports is also considerably less than from the Far East.

Summary and Conclusions

It is the author's opinion that progress can be made to reduce and eliminate fusion and adhesion of rubber bales during ocean shipment by the following methods:

1. Extend packing specifications to include complete wrapping of bales of all grades with equal or better grades of rubber, and make mandatory the use of the RMA coating solution to such bales.
2. Develop non-adhesive separator materials for use between layers of bales which will permit adequate circulation of air and dissipation of mechanically generated heat from the rubber.
3. Employ preferential and spaced stowage techniques where applicable.
4. Equip vessels carrying rubber with apparatus which will provide for adequate ventilation, temperature and humidity control in ships' holds in which rubber is stored.
5. Provide adequate means for training mates on rubber-carrying vessels in the proper methods of rubber storage.

It is hoped that the information in this article and its recommendations and suggestions will be of value to the Marine Survey Co. and its associates who are at present making an investigation of rubber stowage practices.

"Faulty stowage, leading to contamination of cargoes, distortion and obliteration of bale markings, adds thousands of dollars a year to the cost of natural rubber reaching the United States," according to a recent statement of the Rubber Manufacturers Association.

[6]Cargoaire Co., Amesbury, Mass. Distributed by Bailey Refrigeration Co., Inc., Brooklyn, N. Y.

Sixth NBS pH Standard

To increase the accuracy of pH measurements in the highly alkaline range, National Bureau of Standards, Washington, D. C., is recommending a sixth pH standard for use along with the five pH standards previously established, which cover the pH range from 1.68 to 9.18 at 25° C.

The NBS standard pH scale is defined in terms of several fixed points in much the same manner as is the International Temperature Scale. However, the need of a highly alkaline standard has been felt for some years, the NBS says.

The new pH standard is 12.45 at 25° C. It is an easily prepared solution of calcium hydroxide saturated at 25° C. No weighings are necessary, as a solution of reproducible composition can be made by shaking finely granular calcium hydroxide with water.

The calcium hydroxide is prepared by igniting calcium carbonate conforming to American Chemical Society specifications for the reagent grade low in alkalies. The solid material must not be contaminated with soluble alkalies, but the presence of carbonate is of no concern, since calcium carbonate will precipitate from the solution at the time of preparation. The filtered solution of calcium hydroxide super-saturates readily and can normally be used over a wide range of temperatures without separation of the solid phase.

The pH of this solution is a rather sensitive function of temperature. Values of pH on the NBS conventional activity pH scale have been assigned at intervals of five degrees from 0 to 60° C. As yet, NBS does not have standard samples of calcium hydroxide available.

The manufacture of such commercial products as dyes, textiles, ceramics, some rubber products, and paper becomes more rapid and efficient, NBS says, when the pH can be determined with accuracy. The previous standards were set up in 1948.

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Banbury Automation

(Continued from page 78)

tite because of the need of a larger volume of production. Additional workers have been employed because of this increase in production. This increased production is of a healthy kind, since the greater productivity obtained allows for the upgrading of rates without increasing manufacturing costs. At the same time, the hard physical effort which would be required if an attempt were made to obtain this increased productivity by manual means has, instead, been reduced to a minimum and brought far below the effort required in the operation of conventional mixing methods. This, then, is the future of automation—to increase productivity, to lower costs, to upgrade wages, and at the same time to reduce to a minimum the physical effort required to produce goods.

Carbon Black in Voyages 2,000 Miles

EVERY two weeks a large tire plant in Eau Claire, Wis., receives a huge shipment of carbon black that has traveled 2,000 miles by truck and barge from its manufacturing source in Louisiana.

The black is packaged in 300-cubic-foot synthetic-rubber collapsible containers made by United States Rubber Co. at its Providence, R. I., facilities. Called Sealdbin, each container holds an average of 9,000 pounds of carbon black. Paper bags of 50-pound-capacity have been the traditional conveyor of the tire stock reinforcer.

According to U. S. Rubber, the Wisconsin tire plant has been effecting substantial savings from the shipping innovation. Bulk price of the carbon black has been lowered; freight charges have been reduced; in-plant handling costs have been cut; product loss has all but been eliminated; warehouse space has been more effectively utilized; and greater plant cleanliness has resulted.

Cooperating in the shipping venture are United Carbon Co. and Cabot Carbon Co., whose plants are located in the Franklin, La., area, 10 miles inland from the Gulf of Mexico.

United Carbon first loads its Sealdbins of carbon

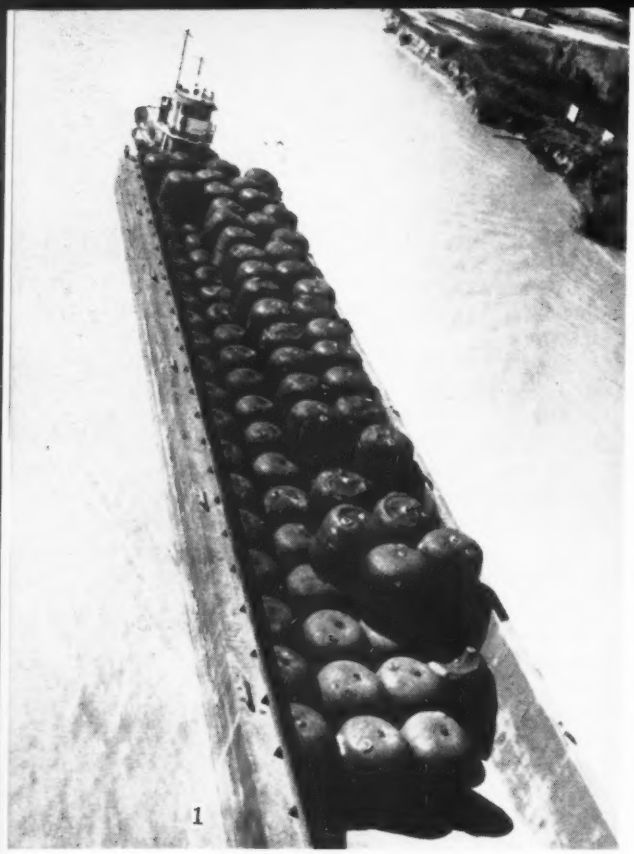
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Fig. 1. Barge containing 500 tons of carbon black in Sealdbin containers is towed by tug down Intracoastal Waterway to New Orleans after departure from carbon black plants in Louisiana

Fig. 2. Completing their long voyage up the Mississippi River, the Sealdbins are unloaded from barge by crane at Alma, Wis.

Fig. 3. A lift truck loads a Sealdbin on to an open-top truck as other containers wait their turn in the storage area of Alma

Fig. 4. Unloaded at the Eau Claire, Wis., tire plant, a Sealdbin is carted to the company's materials handling facilities

Saga of the Sealdbin: to Tire Plant

black on to a huge barge, which is towed down the Gulf Intracoastal Waterway to pick up Sealdbins of Cabot black from the company's Canal and Tate Cove plants. Fully loaded, the barge continues to New Orleans, then turns north into the mouth of the Mississippi River, wending its way up the sluggish waters until it reaches Alma, Wis.

Here the rubber containers are transferred to open-top trucks and taken to the Eau Claire plant. When winter closes navigation on the upper Mississippi, the barge stops at Chicago, and the Sealdbins are shipped the rest of the way by railroad.

The empty containers, collapsed and stacked 70 to a truck, are transported back over the week-end, arriving in Louisiana for refilling Monday morning.

Air-tight, tough, resistant to weather and contact with oils and chemicals, the Sealdbin is constructed of two or more plies of high-strength tire cord and black neoprene, molded together in a high-pressure vulcanizer. Additional reinforcing plies of rubber and cord are used in areas where greater stress may occur.

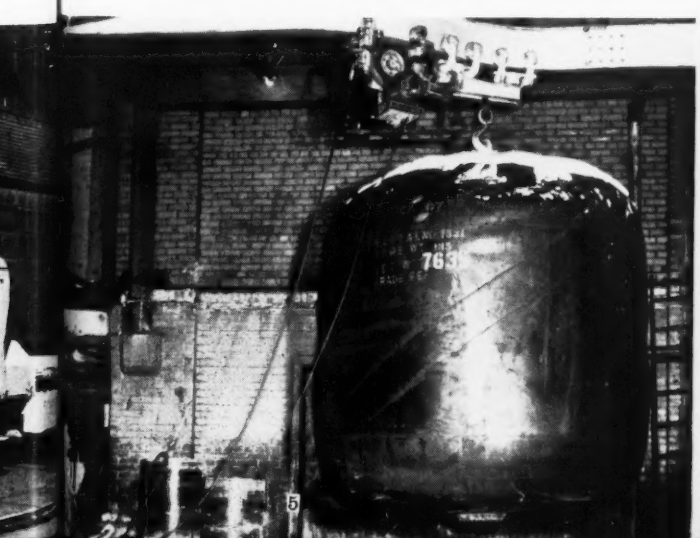
A metal lift-eye in the top center of the container, with several flexible steel cables extending to fittings around the bottom, enables the container to be hoisted and handled after it has been filled. The container is pressurized after it is filled.

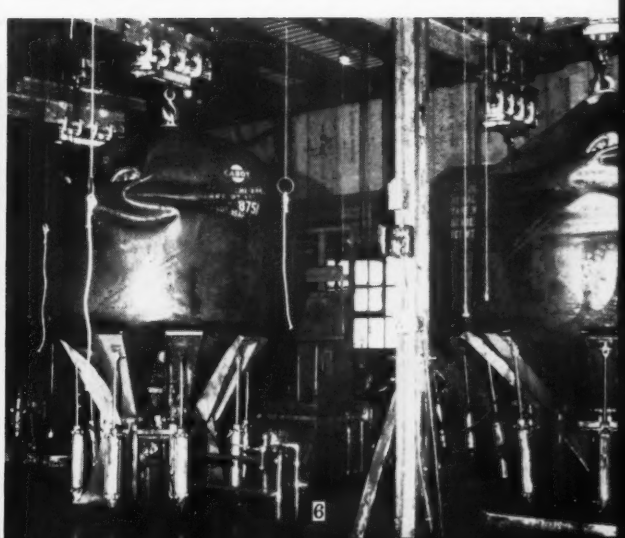
Fig. 5. A workman (*lower left*) controls movement of FEF carbon black-filled Sealdbin along "Monorail" to plant's storage area

Fig. 6. Hooked to ceiling, opened Sealdbins release ISAF and FEF carbon black into hoppers of Banbury mixers

Fig. 7. Its task completed, an empty Sealdbin is hauled away from tire plant across snow-covered yard

Fig. 8. Only its rear doors remain to be shut and bolted and this truck loaded with collapsed Sealdbin containers will begin its return trip to Franklin, La.





EDITORIAL

What Will Rubber Science and Technology Be Like in 1965?

IN THIS column last month we explained that owing to recent efforts of local rubber groups sponsored by the Division of Rubber Chemistry of the American Chemical Society, the Rubber Division itself, and those of other industry organizations, current educational and literature needs of rubber scientists and technologists are now likely to be met in a manner never achieved heretofore. After attending the most recent meeting of the *ACS* and its Rubber and other divisions one might ask, however, *how long these efforts, as comprehensive as they appear to be, will have sufficient scope to satisfy all the needs of the industry and its technologists and scientists?*

As this year's Goodyear Medalist of the Rubber Division, S. M. Cadwell, United States Rubber Co., emphasized in his acceptance address:

"We are in so many fields of science in which such rapid improvements are being made. We are going to have so many different kinds of synthetic rubbers and plastics that we have just got to do a better job of finding out what properties are really needed for the best performance of our many products . . . .

"I see enormous improvements that are to be made in synthetic rubbers and synthetic plastics. Atomic energy and the scientific developments associated with it are opening up large vistas of potential interest to our industry. The growth of automation can change the whole pattern of much of our industry. The scientific part of the rubber industry—the part that you and I are interested in—is one of the most exciting and productive areas of American industry, and it is going to get more so."

Also, in addition to the wide range of scientific interests covered by the papers given before the Rubber Division last month, consider the subjects covered by just a few of the papers of other Divisions of the ACS:

"Fluorocarbon Rubber Research. II. Copolymers of Fluorine-Containing Styrenes, Acrylonitriles, and Vinyl Ethers."

"Preparation and Characterization of Graft Copolymers Derived by Ionizing Radiation."

"Relationship of Modulus of Polyurethane Rubber to Molecular Weight of Polyester Used.'

"Determination of Unsaturation in Butyl Rubber Using Carbon-14 Labeled Isoprene."

Referring again to Dr. Cadwell's address, note his preoccupation with the need to broadening the vision of the rubber industry, particularly in the research and development field, when he said:

"We are now such large factors in the chemical business and in the research and development business that we have to take steps to be sure of at least two things. First, that there is enough fundamental research done preferably in our own country to support the industries in which we have become interested. Second, that there is a sufficient supply of scientists to carry our share of the increased research and development that will be demanded of us."

It is very important that the rubber industry from top management to those just entering upon a career in this industry, always be sure that their vision is broad enough to include all phases of the present and possible future industry. To quote again the oft-repeated phrase of one of our large corporations: "Progress Is Our Most Important Product." Let us be sure we always have enough of it.

R. G. Seaman
EDITOR

Meetings and Reports

Programs of Rubber and Other Divisions Well Attended at 130th ACS Meeting

The 130th meeting of the American Chemical Society in Atlantic City, N. J., September 16 through 21, was attended by almost 11,000 members and guests. Registration for the Division of Rubber Chemistry, which held its meeting at Chalfonte-Haddon Hall, was estimated at 1,200.

E. V. Murphree, special assistant for guided missiles in the Office of the Secretary of Defense, addressed the Society at a banquet in the Convention Hall ballroom on the evening of September 18. Dr. Murphree, who is also president of the Esso Research & Engineering Co., discussed "Guided Missiles and Chemistry."

John C. Warner, president of the Society and of Carnegie Institute of Technology, took as the title for his presidential address on the evening of September 19, the subject, "Is Chemical Education Too Specialized?"

The technical sessions of the Division of Rubber Chemistry began the afternoon of September 19, with A. E. Juve, The B. F. Goodrich Co., Division chairman, presiding. Immediately preceding the first technical session was a luncheon-meeting of the Division's 25-Year Club. The morning technical session on September 20 was featured by the Goodyear Medal Award Address by S. M. Cadwell, United States Rubber Co., entitled "Scientific Contributions to the Rubber Industry." At the business meeting on the same morning it was announced that R. F. Dunbrook, Firestone Tire & Rubber Co., had been elected 1957 vice chairman of the Division. B. S. Garvey, Jr., Sharples Chemicals Division, Pennsylvania Salt Mfg. Co., became chairman for 1957. The Goodyear Medal Award ceremonies were part of the program for the Division banquet on the evening of the 20th.

25-Year Club Luncheon-Meeting

At the luncheon-meeting of the 25-Year Club, 170 were present. E. R. Bridgwater, E. I. du Pont de Nemours & Co., Inc., was chairman for this Atlantic City meeting of the Club and mentioned first that it was the seventeenth gathering of that organization.

He then introduced John Watts, Imperial Chemical Industries, Ltd., who was attending the luncheon as a guest of Jack R. Moore, Harwick Standard Chemical Co.

The next order of business was the introduction of the several new members of the Club, who were asked to stand and identify themselves.

All present stood for a moment of silent tribute to Philip L. Wormeley, of the National Bureau of Standards and one of the founders of the Rubber Division, who passed away on May 25.

In the "elimination contest" for the member present with the longest record of service in the rubber industry, not previously honored by the Club, Clinton H. Schulze, Schenuit Rubber Co., gained that distinction at Atlantic City and was presented with a memento of the occasion. Mr. Schulze had the additional distinction of winning this honor at this his first attendance at a meeting of the 25-Year Club. The Goodyear Tire & Rubber Co. was Mr. Schulze's first place of employment back in 1910, when he entered the rubber industry, after which he was with Seiberling Rubber Co. and Holtite Mfg. Co., before joining Schenuit in 1947 as chief chemist, the position he still holds.

It was announced that the chairman for the next meeting of the Club in Montreal P.Q., Canada, in May, 1957, will be Norman S. Grace, Dunlop Rubber Co. The chairman for the New York meeting in the Fall of 1957 will be W. O. Hamister, Naugatuck Chemical Division, U. S. Rubber.

The Business Meeting

At the business meeting of the Rubber Division held on the morning of September 20, Chairman Juve first mentioned the appointment of Maurice Morton, University of Akron, as editor for the elementary text on basic rubber technology to be prepared from the lectures presented at the several sponsored local rubber group courses.

It was also announced that the Division would publish a fifth issue each year of Rubber Chemistry and Technology, this extra issue to be in the form of "Rubber Reviews," on subjects considered of special interest to the members. This effort will, at least in part, provide for the up-dating of some of the material in the 1937 edition of "Chemistry and Technology of Rubber," by Davis and Blake, and will be in place of a revision of this latter publication.

Both of the two above actions were taken as a result of recent recommendations of the Division's new publications committee headed by Norman Bekkedahl, NBS. Dr. Bekkedahl is also chairman for 1957 of the editorial board for "Rubber Reviews."

The members were asked to stand for a moment of silent tribute for the following members of the Division who had passed on since the last meeting: W. Y. Duncan, Jr., retired; R. E. Hughes, Goodyear; R. L. Randall, Midwest Rubber Reclaiming Co.; and Mr. Wormeley.

The Best Paper Award for the May, 1956, Cleveland meeting was presented by Chairman Juve to H. G. Dawson, Firestone, for his paper, "A Zinc Oxide Viscosity Test for *Hevea* Latex." A letter from the Division secretary to the president of the company for which the winner of this award works is part of the award.

H. W. Hoerauf, U. S. Rubber, chairman of the membership committee, reported the Division now has 2,490 voting members and 576 associate members for a total of 3,066. In order to aid in the drive for new members, a membership application will be enclosed with the mailing of each member's bill for dues this year, with the request that he use it in an attempt to add a new member to the Division.

W. N. Keen, Du Pont, chairman of the tellers committee, next reported on the results of the balloting for officers and directors of the Division. Officers for 1957 will be: Chairman, B. S. Garvey, Jr.; vice chairman, R. F. Dunbrook; secretary, A. M. Neal, Du Pont; and treasurer, G. E. Popp, Phillips Chemical Co. Director-at-large will be J. D. D'Ianni, Goodyear.

Directors elected to represent the areas of the sponsored local rubber groups fol-

B. S. Garvey, Jr., 1957 chairman

R. F. Dunbrook, chairman-elect

low: Akron, K. R. Garvick, Mansfield Tire & Rubber Co.; Boston, T. C. Edwards, Acushnet Process Co.; Buffalo, P. J. Sick, Hewitt-Robins, Inc.; Chicago, V. C. La Brecque, Victor Mfg. & Gasket Co.; Fort Wayne, David Sherman, U. S. Rubber; Los Angeles, R. E. Bitter, B. F. Goodrich Chemical Co.; New York, S. M. Martin, Jr., Thiokol Chemical Corp.; and for the first time from Canada, Norman S. Grace.

Members were reminded of the next meeting of the Division to be held in Montreal, Canada, May 15-17, 1957. This meeting will be held jointly with the Rubber Chemistry Division of the Chemical Institute of Canada, and O. R. Huggenberger, Dominion Rubber Co., Ltd., will be the chairman of the local arrangements committee. The fall meeting in 1957 will be held in New York City, September 11-13, and Henry Peters, Bell Telephone Laboratories, is chairman of the local committee for that meeting.

It was announced that plans were beginning to take shape for the International Rubber Technology Conference to be held in Washington, D. C., November 8-13, 1959. This Conference, which will be another such meeting as was held in London, England, in 1938, 1948, and 1954, will be a joint effort of the Divisions or committees concerned with rubber not only of the A.C.S. but the American Society for Testing Materials, and the American Society of Mechanical Engineers. A steering committee of three members from each of the Divisions or committees of the three societies concerned has been set up. The former Conferences were organized by the Institution for the Rubber Industry of England.

Goodyear Medal Address

The Goodyear Medal Award Address by S. M. Cadwell was given on the morning of September 20. In introducing Dr. Cadwell, Chairman Juve reminded the members and guests present that the Award was being given for the Medalist's "Pioneering research in the field of rubber accelerators and antioxidants," most which was done during the 1919-29 period. Other achievements of Dr. Cadwell mentioned included his tire development work during the 1930-45 period, when he was director of tire development for U. S. Rubber, and the Cadwell-Geer golf ball cover. He has been director of research and development for the entire United States Rubber Co. since 1946.

Dr. Cadwell cited the growth and activity of the Division of Rubber Chemistry as strong evidence of the importance of scientific contributions to the growth of the rubber industry.

"One may measure the importance of technical contributions to an industry by the rate of growth of that industry," he said. "According to figures submitted by the Stanford Research Institute, the rubber industry between the period of 1930 and 1955 had a growth rate of over 5% per year. This growth rate was surpassed only by industrial chemicals, transportation equipment, machinery, and the non-ferrous metals industries."

The Medalist discussed, in order, major challenges which faced the rubber industry, how they were met, and how they have drawn the industry further and further into broad fields of science and chemical production.

The first challenge faced by the industry was the need of a suitable source of its basic raw material, and it was explained how the plantation industry in the Far East was developed to provide more uniform rubber at a lower price than wild rubbers first available.

The next challenge was the problem of natural rubber latex, its preservation and transportation half way around the world without coagulation, and present-day uses of latex in tire cord treatment, for the manufacture of foam sponge and many other diverse products, attest to the success of the work done to meet this challenge.

The need of reducing the time of vulcanization was met by the development of modern organic accelerators while at the same time improved service life of the products made was obtained. About 1¼ pounds of organic accelerators are now used for every 100 pounds of natural and synthetic rubbers.

Other challenges met by the industry or by industries associated with it were the need of better wearing tires, which resulted in the development of carbon blacks; the need of greater resistance to oxidative deterioration, resulting in antioxidants; the need of improved reinforcing fibers for tires and other rubber products, which brought forth cotton, rayon, and nylon for these purposes; and replacements and improvements on natural rubber which have given us many general-purpose and specialty polymers.

The rubber industry along with the chemical industry pioneered the production and use of polyvinyl chloride, and today more than half of the production capacity of this country for the manufacture of this plastic is in plants owned and operated by rubber companies. These same companies use about 15% of the PVC produced.

In connection with research in the rubber industry, Dr. Cadwell pointed out that the chemical industry has spent more than twice as much of its sales dollars on research and development as the rubber industry, and we must match this percentage of spending if we are going to remain competitive in this portion of our business, he said. Also, mention was made of the rubber research institutes in England, France, and Holland and their notable scientific contributions to the rubber industry, and the Medalist added that it is reasonably evident that if we wish to form and support institutes of this sort to do fundamental work over a term of years, they will come up with comparable outstanding developments.

In conclusion, Dr. Cadwell predicted that we are going to have so many different kinds of synthetic rubbers and plastics in the future that we will have to do a better job of finding out what properties are really needed for the best performance in many of our products. This is a field of research in itself and one that probably has to be done by the rubber industry. The future of our industry will continue to be determined by how well we meet the challenges of the future.

The Technical Sessions

Abstracts of papers presented before the Atlantic City Rubber Division meeting appeared in our August issue, beginning on page 719. Some additional comments

At social hour preceding 25-Year Club luncheon meeting *(left to right)*: E. R. Bridgewater, Du Pont, chairman for the luncheon meeting; H. A. Winkelmann, Dryden Rubber Division, Sheller Mfg. Co., one of the founders of the Club; and E. B. Busenberg, Goodrich, Club secretary; O. D. Cole, Firestone; John Watts, Imperial Chemical Industries, London, guest of Jack Moore, Harwich Standard Chemical Co., on extreme right

on some of these papers, however, are in order.

"Properties of a New Fluorine-Containing Elastomer," by J. S. Rugg and S. Dixon, Du Pont, which was described as a copolymer of vinylidene fluoride and hexafluorpropylene, aroused considerable interest because of the physical properties retained after exposure to air, petroleum oils, diester lubricants, and ester hydraulic fluids at temperatures of 400 to 500° F. It was emphasized that this elastomer is still in the research stage.

"Rubbery Polymers and Copolymers Prepared with the Use of Complex Metal Catalysts," by Robert S. Aries, Robert S. Aries & Associates, was similarly well received because of the relation of such polymers to those prepared by Zeigler-type catalysts.

"Carbon Black in the Oxidation of GR-S Vulcanizates," by J. Reid Shelton and William T. Wickham, Jr., Case Institute of Technology, emphasized the fact that carbon black acceleration of the oxidation of styrene-butadiene rubber may be attributed to the effect of several factors including surface catalysts of the oxidation reaction, catalysis of peroxide decomposition to free radicals, adsorption of antioxidants, and increased solubility of oxygen. Inhibition of oxidation by carbon black may be due to carbon black acting as a free radical acceptor, induced decomposition of peroxide to stable products, and deactivation of metal catalysts of oxidation. The net effect in any instance is therefore due to the magnitude of the individual effects in the vulcanizate.

"Resistance of Rubber Compounds to Outdoor and Accelerated Ozone Attack," by C. V. Lundberg, G. N. Vacca, and B. S. Biggs, Bell Telephone Laboratories, attracted much interest because of the scope of the investigation and the evidence of correlation between outdoor and indoor accelerated ozone tests and the number of styrene-butadiene and neoprene rubber compounds tested.

"Carbon Blacks for Highly Conductive Rubber," by M. H. Polley and B. B. S. T. Boonstra, Godfrey L. Cabot, Inc., explained the development of a new grade of conductive black capable of maintaining the conductivity of compounds even at 75% elongation.

"Organic Nature of Carbon Black Surfaces," by J. V. Hallum, Mellon Institute of Industrial Research, suggested the use of a dropping mercury electrode polarograph for investigations of carbon black surfaces and explaining the development of a theory of reaction mechanisms of elastomers with carbon blacks. This work was done for Columbian Carbon Co.

"Non-Blooming, High Temperature-Resistant Vulcanizing Agent for Natural and Synthetic Rubbers," by K. R. Cranker and V. H. Perrine, Thiokol Chemical Corp., described a new liquid vulcanizing agent containing sulfur, called VA-7. Interest in this new vulcanizing agent was great.

"Some Aspects of the Heat Treatment of Butyl Compounds," by D. C. Edwards and E. B. Storey, Polymer Corp., Ltd., explained how the optimum conditions for the realization of all of the benefits of heat treatment may be obtained by heating a high-black masterbatch in the presence of the promoter and then diluting the mix with raw polymer.

S. M. Cadwell *(left)* receives Goodyear Medal from Rubber Division Chairman Juve

"Influence of Petroleum Oils on Staining and Discoloration of Elastomers," by H. M. Tramutt and E. G. Anderson, Gates Rubber Co., and F. S. Rostler and R. M. White, Golden Bear Oil Co., presented some new facts on the relation between the composition of such oils, when used in rubber compounds, and the extent of their discoloration in the compound. It was found that color and color stability of a rubber compound cannot be predicted from the color or color stability of the oil itself.

"Physics of the Friction of Rubber on Rough Surfaces," by F. W. Boggs and W. P. Riemen, U. S. Rubber, provided a remarkably clear explanation of complex factors involved in the measurement of frictional force and its relation to variables such as slip, hysteresis, and modulus.

"Elasticity and Break of Compounded Rubbers," by H. K. J. DeDecker, U. S. Rubber, was another paper in which the complex relations involved, this time in connection with the reinforcing effect of fillers on rubber compounds, were explained very clearly in terms of molecular quantities, and a simple theory was developed which may prove more valuable in characterizing rubber vulcanizates than conventional stress-strain data.

The Division Banquet

At the Division banquet on the evening of September 20, Chairman Juve pointed out that the Rubber Division was 37 years old in September, and that the present membership of 3,066 was a new record.

He added that this year's Goodyear Medalist, Dr. Cadwell, was the thirteenth to receive this honor.

Alden Emery, executive secretary of the parent Society, was introduced and spoke briefly on Society and Division activities.

The Goodyear Medal Award ceremonies began with a short talk by J. P. Coe, former vice president, U. S. Rubber, who spoke on "The Man and His Accomplishments." Mr. Coe first recalled that he had known Dr. Cadwell as a business associate and friend for 37 years. He added that when the Medalist joined U. S. Rubber in 1919, he reported to E. B. Curtis and Mr. Coe, but that soon they were involved in the manufacture of products developed by Dr. Cadwell. He paid tribute to the latter's energy, courage, and abilities from his early years up to the present time which have made him one of the outstanding research chemists and administrators in the industry today.

The Medalist was then presented to Chairman Juve by John Ball, chairman of the Goodyear Medal Award committee for 1956, and Dr. Cadwell then received the scroll, medal, and honorarium and the further congratulations of Chairman Juve.

The banquet program was concluded with several variety acts.

Polymer Division Papers

Space limitations prevent detailed comment on papers presented before other Divisions of the Society, but listed below are certain papers given before the Division of Polymer Chemistry that should be of special interest for further investigation:

"Fluorocarbon Rubber Research. Copolymers of Fluorine-Containing Styrenes, Acrylonitriles, and Vinyl Ethers." A. N. Bolstad, E. S. Lo, and G. H. Crawford, M. W. Kellogg Co., and J. C. Montermoso, Quartermaster Research & Development Center.

"Polyesters from Fluorine-Containing Diols." George C. Schweiker and Paul Robitschek, Hooker Electrochemical Co.

"Thermally Stable Copolymers of Vinylidene Fluoride." S. D. Dixon and D. R. Rexford, Du Pont (companion paper to the one presented before the Rubber Division).

"Principles of the Synthesis of Graft and Block Copolymers." H. F. Mark, Polytechnic Institute of Brooklyn.

"Graft Copolymerization in Emulsion." R. A. Hayes and W. R. Conard, Firestone.

"Synthesis and Identification of Block Copolymers of Butadiene and Styrene." R. J. Orr and H. Leverne Williams, Polymer Corp., Ltd.

"Preparation and Characterization of Graft Copolymers Derived by Ionizing Radiation." W. K. W. Chen and R. B. Mesrobian (present address Continental Can Co.), Brooklyn Poly, and D. S. Ballantine, A. Glines, and D. J. Metz, Brookhaven National Laboratory.

"Proposed Mechanism for the Polymerization of Ethylene by the Ziegler Process." F. J. Welch and others, Carbide & Carbon Chemicals Co.

"Kinetic Constants in Butadiene Polymerization." Maurice Morton and S. D. Gadkary, University of Akron.

"Control of Size Distribution and Number of Particles in Emulsion Polymerization." C. P. Roe and P. D. Brass, U. S. Rubber.

"Mechanical Properties of a Polyurethane Elastomer in the Rubber to Glass Transition Zone." Robert F. Landel, California Institute of Technology.

"Determination of Unsaturation in Butyl Rubber Using Carbon-14 Labeled Isoprene." L. R. McNail and L. T. Eby, Esso Research & Engineering Co.

Plastics Division Papers

The Division of Paint, Plastics & Printing Ink Chemistry had a symposium on

isocyanate polymers, and probably all the papers presented should be of interest for further investigation by rubber chemists. The several particular papers listed below might be considered first:

"Polyurethane in New Plastics." Otto Bayer, Farbenfabrillen Bayer, Germany.

"Kinetics of Isocyanate Addition Reactions." Maurice Morton and M. A. Deisz, University of Akron.

"New Reactions of Phenyl Isocyanate and Ethyl Alcohol." I. C. Kogon, Du Pont.

"Stability of Urethanes." C. B. Reilly and Milton Orchin, University of Cincinnati.

"Solubilization-Depolymerization of Urethane Foam Scrap." J. Winkler, American Collo Corp.

"Relationship of Modulus of Polyurethane Rubber to Molecular Weight of Polyester Used." J. R. Little and R. A. Gregg, U. S. Rubber.

Rubber Literature Symposium

The joint symposium of the Chemical Literature and Rubber Chemistry Division arranged and conducted by Miss Hanna Friedenstein, Godfrey L. Cabot, Inc., lived up to expectations in providing a collection of particularly pertinent papers on jargon, natural, synthetic, and reclaimed rubber literature, classification schemes, rubber compounds, patents, standards and specifications, government reports, market information sources, new publications, and the creation of new literature.

Abstracts of these papers appeared in our August issue beginning on page 724. It is expected that provisions will be made for the publication of these papers as a unit either by the parent Society or one of the participating Divisions.

Simon Collier, *(left)*, Johns Manville Corp., and B. B. Wilson, publisher, RUBBER WORLD

Connecticut Group Course

Under the sponsorship of the Connecticut Rubber Group, a 12-lecture basic elastomer technology course got under way at Yale University, New Haven, Conn., September 12, and will continue weekly until November 28.

The lecturers have included W. J. O'Brien, Seamless Rubber Co.; J. M. Ball, Midwest Rubber Reclaiming Co.; E. L. Borg and C. W. Lawson, Naugatuck Chemical Division; W. L. Dunkel, Enjay Co.; P. C. Servais, Dow Corning Corp.; J. P. Munn, B. W. Fuller, and R. A. Stengard, E. I. du Pont de Nemours & Co., Inc.; Julian Panek, Thiokol Chemical Corp.; and Walter R. Smith, Godfrey L. Cabot Co.

The remaining speakers and the subjects and dates of their lectures are: Ralph F. Wolf, Columbia-Southern Chemical Corp., "Non-Black Compounding Ingredients," October 24; A. R. Davis, American Cyanamid Co., "Accelerators," October 31; George H. Hunt, Simplex Cable & Wire Co., "Antioxidants, Etc., and Polymer Degradation," November 7.

Also, Gus Maassen, R. T. Vanderbilt Co., "Testing of Rubber and Compounding for Specific Effects and Measurement of Physical Properties," November 14; E. Ahlefeld, Farrel-Birmingham Co., Inc., "Rubber Processing Equipment and Plant Layout," November 21; and R. Waterman, R. T. Vanderbilt, "Latex Foam Sponge Rubber," November 28.

Planned Southern Group To Meet November 16-17

Considerable interest has developed in the recent past in the formation of a local rubber group to serve the needs of the industry in the more southerly states of Mississippi, Tennessee, Alabama, Louisiana, and Texas. A poll of rubber goods manufacturers and their suppliers in the area showed 46 rubber companies interested in participating in such a local group, and an even larger number of the supplier companies has indicated their interest.

An organization committee headed by H. Connell, Armstrong Tire & Rubber Co., Natchez, Miss., and including John Bolt, Naugatuck Chemical Division, United States Rubber Co., Memphis, Tenn.; John Galloway, elastomers division, E. I. du Pont de Nemours & Co., Inc., Houston, Tex.; Ed Keil, Goodyear Tire & Rubber Co., Gadsden, Ala.; Monroe Mirsky, Guiberson Corp., Dallas, Tex.; and R. W. Rice, Firestone Tire & Rubber Co., Lake Charles, La., have planned a meeting for November 16 and 17, at the Jung Hotel in New Orleans, La. There will be an organizational meeting and banquet on November 16, with B. S. Garvey, Jr., Sharples Chemicals Division, Pennsylvania Salt Mfg. Co., vice chairman, Rubber Division, ACS, and M. E. Lerner, *Rubber Age*, the featured speakers.

On November 17, the program will consist of a morning panel discussion on "Compound Design" and an afternoon panel discussion on "Elastomers for Present-Day Use."

Anyone interested in attending this first meeting of the Southern Rubber Group is welcome, and further information may be obtained from any member of the organization committee.

North California Addressed On Rubber in Railroads

The use of rubber by the railroad industry was the subject of a talk given by Paul V. Garin, of the research and mechanical standard engineering department of the Southern Pacific Co., before 73 members and guests of the Northern California Rubber Group at the Elk's Club, Berkeley, Calif., September 13.

Mr. Garin described the American Association of Railroads' specifications and standards for various rubber goods. He also discussed new areas of rubber application, such as molded composition brake shoes, laminated rubber-and-metal coupler cushions, and molded rubber tie plates.

Two golf outings were held by the Group during the summer. The scene of the first, on July 13, was the Richmond Country Club. John Potts, Quaker Pioneer, achieved the lowest net score for the afternoon; while Frank Roberts, Oliver Tire & Rubber Co., carded the most sevens, winning the blind bogie. Golf chairman for the day was Claude Corkadel, Oliver Tire.

Castlewood Country Club, Pleasanton, Calif., was the scene of the organization's second golf outing on August 24. John Potts, Quaker Pioneer, scored the lowest gross of the day with an 86; came back to win low net for Class A with 74.

Class B was won by Drace Kutnewsky, Burke Rubber Co., who netted 73; while Bob Mahin, Quaker Pioneer, topped Class C with 73. Harry Gleason, Quaker Pioneer, made the longest drive of the afternoon. John Potts returned to the winning column with the most accurate drive. Chairman of the outing was Ralph Hickcox, Goodyear chemical division.

Tlargi Repeating Course

The basic rubber technology course of The Los Angeles Rubber Group, Inc., got under way again this year at the University of Southern California, Los Angeles, Calif., September 27. A non-credit, no-prerequisite course, it is designed to present a broad picture of the industry to new or specialized personnel in rubber and related fields, according to the Group's class director, L. E. Peterson.

The first semester of the course will consist of lectures on natural and synthetic rubbers, basic compounding, processing, curing, equipment, design, and plant visits. The second semester will include lectures on silicones, neoprene, reclaimed rubber, foam and sponge, carbon black and cements, and work in Tlargi's rubber testing laboratories.

Quality Control Exposition

The eleventh annual convention and exposition of the American Society for Quality Control will be held in the Masonic Temple, Detroit, Mich., May 22-24, 1957, according to Wade R. Weaver, Republic Steel Corp. executive, chairman of the event.

The rise of industrial automation has given added importance to management's selection of quality control tools, instruments, gages, computing machines, control techniques, and thousands of other quality control items, Mr. Weaver said.

Rubber & Plastics Division, ASME, New York Program

The Rubber & Plastics Division of the American Society of Mechanical Engineers will hold a one-day technical meeting in New York, N. Y., November 29, as a part of the annual meeting of the parent Society. The Division's program will feature papers containing new information and developments in the processing of rubbers and plastics and on a new chlorine-containing polyether.

This meeting will be held at the Statler Hotel and is open to both members and non-members of the Society. R. G. Seaman, RUBBER WORLD, is 1956 chairman of the Division, and F. J. Wehmer, Minnesota Mining & Mfg. Co., is the secretary.

The program consists of two technical sessions, one in the morning, and the other in the afternoon of November 29. Chairman for these technical sessions is Prof. James M. Church, Columbia University. The chairmen and vice chairmen for each of the two sessions are indicated below together with the titles and authors of the papers to be presented.

Rubber & Plastics Division, ASME
Session No. 1
Chairman: C. H. Adams, Monsanto Chemical Co., Plastics Division
Vice Chairman: Murrey Longstreth, Dow Chemical Co., Plastics Division

"The Fundamental Mechanics of Reinforced Plastics." J. Ogden Outwater, Jr., University of Vermont.

"Penton — A New Chlorine-Containing Polymer." E. W. Cronin, Hercules Powder Co.

"Electrical Effects Accompanying a Stick-Slip Phenomenon of Sliding of Metals on Plastics and Lubricated Surfaces." S. M. Skinner, J. Gaynor, and G. W. Sohl, Case Institute of Technology.

"A Review of Developments in Plastics Engineering, 1955-56." Bryce Maxwell, Princeton University.

Session No. 2
Chairman: Sherman Doner, Manhattan Rubber Division, Raybestos-Manhattan.
Vice Chairman: W. M. Petry, University of Akron

"Polymer Properties Involved in Process Equipment Design." H. J. Karam, Dow Chemical.

"Roll Bending Applied to Rubber and Plastics Calenders." R. C. Seanor, Adamson-United Co.

"High Horsepower Banbury Mixer." R. N. Comes, Farrel-Birmingham Co., Inc.

"Recent Developments in the Field of Mixer-Extruders." John F. Drew, National Rubber Machinery Co.

It is expected that preprints of almost all of these papers will be available at the time of the meeting.

A meeting of the Division's executive, advisory, and general committees will be held at noon on November 29.

Program Is Announced for Canadian Polymer Forum

The preliminary program of the Seventh Canadian High Polymer Forum, to be held at the Guildwood Inn, Sarnia, Ont., November 8 and 9, has been released by the Chemical Institute of Canada and the National Research Council of Canada, cosponsors of the event.

Scheduled for the November 8 technical session are the following authors and the subjects of their papers:

R. J. Orr and H. Leverne Williams, Polymer Corp., Ltd., **"Copolymerization Theory Extended to the Copolymerization of Aconitic Acid";** K. E. Russell, Queen's University, **"Diradicals in Polymerization Reactions";** Wilfried Heller, Wayne State University, **"Light Scattering and Its Application to the Study of the Mechanism and Kinetics of Emulsion Polymerization";** S. Bywater, NRC, **"Polymerization of Alpha-Methyl Styrene by Boron Trifluoride-Water-Etherate Complex."**

Also, J. A. Parker, J. J. Thomas, J. Versnel, and C. L. Zeise, Armstrong Cork Co., **"Aromatic Isocyanate Reactions and Reaction Products of Carboxylic Acids";** N. S. Nikolov and L. A. McLeod, Polymer Corp., **"Studies of Graft Copolymers";** M. L. Miller, American Cyanamid Co., **"Block and Graft Copolymers from Acrylamide and Acrylonitrile and from Acrylamide and Acrylic Acid";** Michael Szwarc, State University of New York, **"Living Polymers";** L. M. Hobbs, University of Michigan, **"Viscosity of Dilute Solutions of Linear and Branched Polyvinyl Acetate";** and J. A. Manson and L. H. Cragg, McMaster University, **"A Viscosity and Light Scattering Study of Some Graft Polymers."**

Scheduled for November 9 are the following:

Morton A. Golub, The B. F. Goodrich Co., **"Viscosity of Natural Rubber Solutions at Extremely Small Rates of Shear";** S. N. Chinai, R. J. Samuels, R. Guzzi, A. L. Resnick, and J. D. Matlach, Picatinny Arsenal, **"Comparison of Dilute Solution Properties of a Series of Methacrylate Ester Polymers";** C. A. F. Tuynman and J. J. Hermans, University of Leiden, **"Non-Newtonian High-Precision Viscometry of Polyvinyl Acetate in Toluene";** Masayuki Nakagaki, Wayne State U, **"Theory of Foam Formation of High Polymer Solutions";** D. A. I. Goring, Pulp & Paper Research Institute of Canada, **"The Lignin Macromolecule."**

Also, W. Cooper and E. Catterall, Dunlop Rubber Co., **"Copolymers of Butadiene and Unsaturated Acids: Cross-Linking by Metal Oxides";** Kozo Kawata, Scientific Research Institute of Japan, **"On the Photoelastic Behavior of Methyl Methacrylate-Diallyphthalate Copolymers";** H. Baum and G. A. Gilbert, University of Birmingham, and M. V. Lock, British Rayon Research Association, **"The Photo-Degradation of Amylose";** D. W. Saunders, British Rayon, **"The Photoelastic Properties of Rubber-like Polymers";** T. Hideshima, H. Nakane, and S. Iwayanagi, Scientific Research Institute of Japan, **"Stress Relaxation and Relaxation Spectrum of Polymethyl Methacrylate in Its Secondary Dispersion Region";** S. Bywater, NRC, **"Depolymerization of Poly-Alpha-Methyl Styrene";** and Frederick R. Eirich, Polytechnic Institute of Brooklyn, the title of whose address has not been revealed.

Reservations for the Forum may be obtained from Dr. H. Leverne Williams, Chairman, Seventh Canadian High Polymer Forum, c/o Polymer Corp., Ltd., Sarnia, Ont., Canada.

SPE National Conference

"Fifteen Years of Plastics Progress" will be the theme of the thirteenth annual National Technical Conference of the Society of Plastics Engineers, Inc., Greenwich, Conn., to be held at the Hotel Sheraton-Jefferson, St. Louis, Mo., January 16-18, 1957. Technical sessions will cover a wide range of topics in plastics engineering and research.

The 15 technical sessions will have the following titles and moderators:

"Tooling and Machinery," Islyn Thomas, Newark Die Co.; "Atomic," David Balantine, Brookhaven Laboratories; "Design," R. B. Akin, E. I. du Pont de Nemours & Co., Inc.; "Extrusion, I," Clem Young, Crescent Plastics; "Injection, I," (moderator not determined); "Foams," Arnold Varner, General Electric Co.; "Injection, II," Gordon Thayer, Dow Chemical Co.; "Extrusion, II," George Prall, Western Textile Co.

Also "Applications," Albert Lightbody, Naval Ordnance; "Reinforced Plastics, I," (moderator not determined); "Instrumentation," Don Walley, KSH; "Compression Molding," Edward F. Borro, Sr., Brookhaven Labs; "Reinforced Plastics, II," (moderator not determined); "Polyethylene," (moderator not determined); and "Epoxy," Jerry Formo, Minneapolis-Honeywell Co.

A research conference and an educational session, as well as various social activities, will also be held.

Information on registration may be obtained from the Registration Chairman, Harold A. Holz, Bakelite Co., 122 N. Kirkwood Rd., Kirkwood 22, Mo.

Rheology Society to Meet

The Society of Rheology will hold its 1956 annual meeting in Pittsburgh, Pa., November 7-9, with technical sessions being conducted at the Mellon Institute and social gatherings at Webster Hall. The organization's Bingham Medal will be awarded November 8.

Papers scheduled for presentation will deal with adhesion, the effect of hydrogen on metals and metal alloys, methods for the experimental determination and theoretical evaluation of viscosity data, and the mechanical rupture of polymeric materials.

Southern Ohio Sponsoring Rubber Engineering Series

The Southern Ohio Rubber Group, in cooperation with the Engineers' Club of Dayton, has begun a lecture and discussion series on "Rubber as an Engineering Material" at the Engineers' Club, 110 E. Monument Ave., Dayton, O. The program will run twice monthly until April 6, 1957.

T. H. Rogers, Jr., The Goodyear Tire & Rubber Co., opened the series on September 26 with a talk on "Natural Rubber and Reclaim." J. F. Svetlik, Phillips Chemical Co., followed on October 3 with a lecture on "GR-S: the General-Purpose Synthetic Rubber."

The remainder of the program follows:

October 23—G. A. Daum, B. F. Goodrich Chemical Co., "Special-Purpose Synthetic Rubbers, I. Nitriles, Polyacrylates, and Polysulfides."

November 7—B. V. Stangor, E. I. du Pont de Nemours & Co., Inc., "Special-Purpose Synthetic Rubbers, II. Neoprene, 'Hypalon,' and Polyurethanes."

November 21—"Special-Purpose Synthetic Rubbers, III." S. S. Pomeranz, Vernay Laboratories, "Perfluoropolymers"; R. J. Ohm, Dow Corning Corp., "Silicones"; D. Farynyk, Enjay Corp., "Butyls."

February 6, 1957—J. L. Fitzgerald, Premier Rubber Co.; E. N. Cunningham, Precision Rubber Products Corp.; M. N. Murray, Vernay Labs; and G. R. Overman, Inland Mfg. Division, General Motors Corp., "Molded Goods: Compression, Transfer, Injection and Precision Molding."

February 20—G. W. Beck and R. E. Antheil, Inland Mfg., "Extruded Sections: Hose and General Extrusions."

March 6—C. G. Wyman, D. L. Waugh, A. M. Wightman, and R. S. Radow, Dayton Rubber Co., "Fabricated Products: Tires, Belts, Rolls, and Mechanical Goods."

March 20—B. Adinoff, Dayton Rubber, and S. L. Brams, Dayton Chemical Products Laboratories, "Special Products: Fabric Reinforcement, Rubber-to-Metal Bonding, Latex Foam and Mechanical Sponge."

April 6—W. A. Frye, Inland Mfg., "Rubber Specifications and Testing."

An enrollment fee of $10 is charged for the 10 lectures. Registration information may be obtained from James R. Wall, Inland Mfg. Division, General Motors Corp., Box 1050, Dayton 1, O.

Polymer Lecture Series Renewed at Akron U

Leo Mandelkern, of the Bureau of Standards, inaugurated the tenth anuual series of the Akron Polymer Lecture Group on October 5 with a discussion of "Crystallization in High Polymers."

The lecture series, conducted under the auspices of the University of Akron, will continue once a month until May, 1957, with meetings beginning at 8:00 p.m. in Room 107, Knight Hall, University of Akron.

The seven remaining speakers and the subjects of their talks are as follows:

November 2: C. C. Price, University of Pennsylvania, "Polymerization of Cyclic Oxides."

December 7: Edmund Field, Standard Oil Co. (Indiana), "Catalyst Systems for the Production of Crystalline Polyethylenes."

January 4, 1957: Rolf Buchdahl, Monsanto Chemical Co., "Some Mechanical Properties of Heterogeneous Polymeric Systems."

February 1: J. H. Dillon, Textile Research Institute, "Recent Developments in Fibers."

March 1: D. S. Ballantine, Brookhaven National Laboratory, "Radiation Produced Graft Polymers."

April 5: J. R. Shelton, Case Institute of Technology, "Some Studies on the Oxidation of Elastomers and Their Compositions."

May 3: W. L. Ruigh, Wright Air Development Center, "Boron Polymers."

Inquiries should be addressed to R. A. Briggs, Program Chairman, Research Laboratory, The General Tire & Rubber Co., Akron 9, O.

Record Turnout at Philadelphia Group Outing

A record 305 members and guests turned out for the annual summer outing of the Philadelphia Rubber Group at the Manufacturers Golf & Country Club, Oreland, Pa., August 17. Henry Pryor, R. E. Carroll, Inc., took top honors among the 150 competing golfers, winning the Julius Muehlstein trophy for his low gross score.

Second and third low gross prizes were won by W. B. Curtis, Naugatuck Chemical and Warwick McCutcheon, Goodrich-Gulf, respectively. Low gross winner among the guests was Frank Newton. Taking the hole-in-one contest were F. W. Herr, Wm. Pender, and H. Graber, a guest.

A dead heat for most "threes" among members was achieved by J. W. Baymiller, Armstrong Cork Co.; Ray Hurst, H. M. Royal Co.; John Roberts, Quaker Rubber Corp.; and F. M. Tolin, Alco Oil & Chemical Co. Scoring for the guests in this category was Harold Reehling.

Top honors in the Calloway system were copped by R. J. Rainar, Armstrong. Involved in a five-way tie for second place were P. C. Cramer, B. F. Goodrich Chemical Co.; K. Cranker, Thiokol Chemical Corp.; P. G. Connell, American Cyanamid Co.; J. S. Hickman, E. I. du Pont de Nemours & Co.; and J. Pawless, Thiokol.

In the Calloway system competition for guests, first place honors were shared by J. M. Jester, E. S. Kern, Ron Morgan, and R. J. Rhoads. J. P. Geris, Bonafide Mills, and F. M. Tolin, Alco, divided the first prize in the putting contest. Highest gross for the day was racked up by Ken Quinn, Moreland Corp.

J. R. Mills, Goodall Rubber Co., outing chairman, was assisted by T. N. Loser, Wyrough & Loser; R. B. Carroll, Carroll, Inc.; T. W. Elkin, R. T. Vanderbilt Co.; A. L. Shaw, B. F. Goodrich Co.; and V. H. Perrine, Thiokol.

Boston Course Under Way

The 1956-57 basic course in rubber technology sponsored by the Boston Rubber Group began on October 1 and will continue at Northeastern University, Boston, Mass., until January 21, 1957.

The course is a basic and practical study of compounding and processing of natural and synthetic rubbers and is designed for beginning compounders, salesmen, purchasing agents, production supervisors, and university students. Robert Loveland, district representative of R. T. Vanderbilt Co., is the instructor.

Further information may be obtained from Nelson Cobb, Northeastern University, Evening Division, 360 Huntington Ave., Boston 15, Mass.

SPI Pacific Coast Show

The 1957 annual National Conference and Pacific Coast Plastics Exposition, sponsored by The Society of the Plastics Industry, Inc., will be held in Los Angeles, Calif., March 18-21. Conference sessions will be held at the Hotel Biltmore, and the Exposition will be housed at the Shrine Exposition Hall.

The event will mark the first time that a plastics trade show has been held in the Los Angeles area. James C. Prior, Sierra Electric Co., who is chairman of the Pacific Coast Section of SPI, has appointed J. Allen Carmien, Nupla Mfg. Co., chairman of both Conference and Exposition.

Compounding Course Open

The Chicago Rubber Group has begun its annual basic course in rubber compounding. Consisting of a series of lectures, the course got under way October 2 and will continue until April 2, 1957. Lectures are taking place at the John Marshall Law School, Chicago, Ill.

Subsequent lectures in the 25-lecture series will cover carbon blacks, organic reinforcing materials and resin-type plasticizers, softeners and plasticizers, accelerators, antioxidants, neoprenes, nitrile rubbers, butyl rubber, Thiokol, reclaimed rubber, silicones, polyacrylates, general-purpose compounding, special application compounding, factory processing, and problem analysis.

Harold Stark, Dryden Rubber Division, is the coordinator of the course. Information on registration may be obtained from John C. Gallagher, Chicago Allis Mfg. Corp., 113 N. Green St., Chicago 7, Ill.

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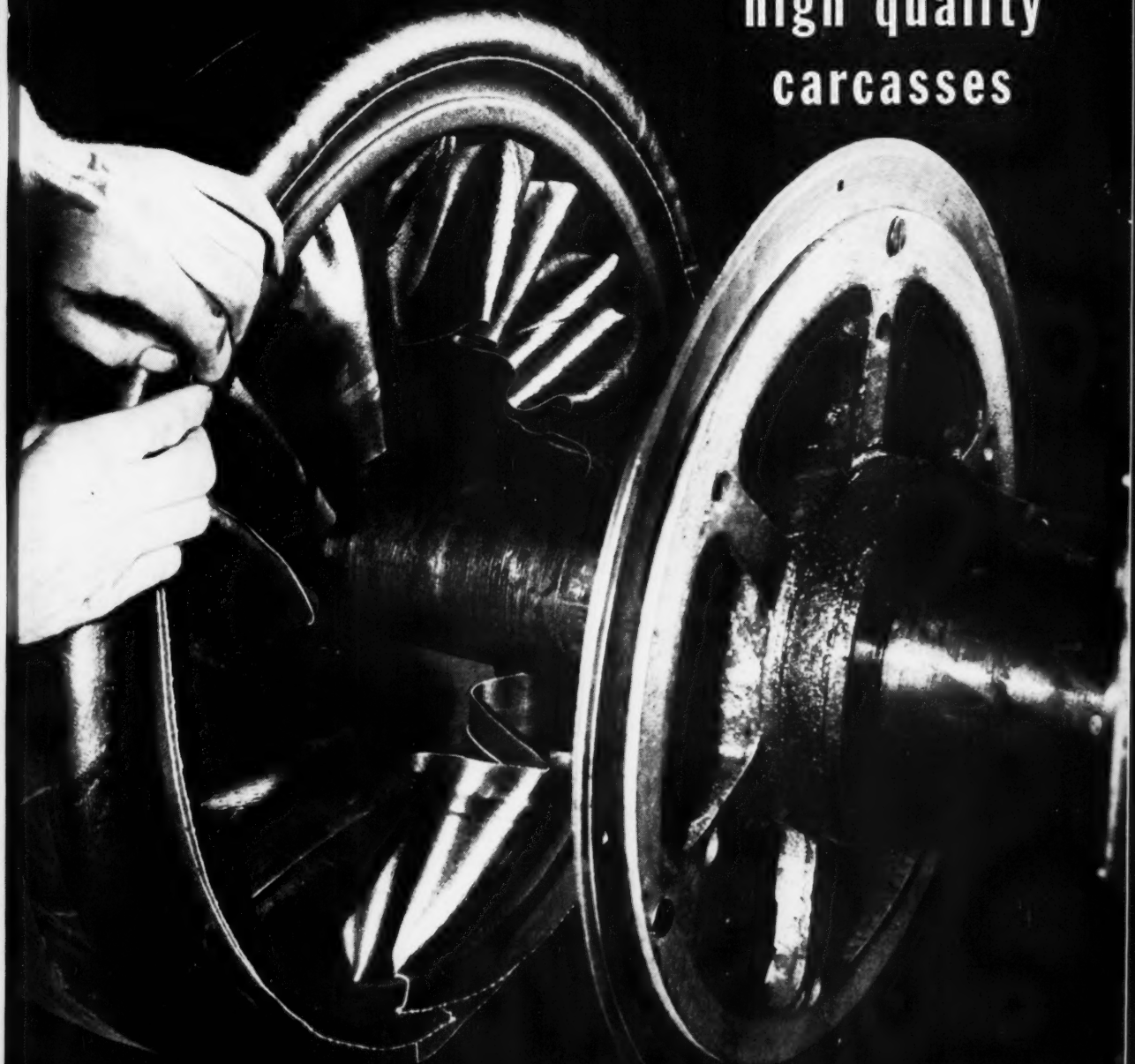

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N. Y. ACS Lecture Series on Polymer Chemistry Begins

Three in a series of ten lectures on 'Recent Advances in the Theory and Practice of Polymer Chemistry" have been presented by the New York Section of the American Chemical Society in the Union Carbide & Carbon Corp. Bldg., 30 E. 42nd St., New York, N. Y.

T. Alfrey, Jr., Dow Chemical Co., opened the series on September 26 with a talk on "Fundamental Principles of Polymerization." J. J. Bohrer, International Resistance Co., and N. G. Gaylord, Interchemical Corp., dealt with "Principles of Copolymerization and Chain Transfer" and "Graft and Block Polymerization," respectively, on October 3 and 10.

The lectures will continue every Wednesday from 7:00 to 9:00 p. m. until December 5. The remaining schedule follows:

October 17—C. G. Overberger, Polytechnic Institute of Brooklyn, "New Aspects of Ionic Polymerization."

October 24—H. Mark, Polytechnic Institute of Brooklyn, "Coordinate Polymerization."

October 31—R. B. Mesrobian, Continental Can Co., "Polymerization and Cross-Linking by Ionizing Radiation."

November 7—E. M. Fettes, Thiokol Chemical Corp., "Survey of New Polycondensation Reactions."

November 14—R. M. Fuoss, Yale University, "Synthetic Polyelectrolytes."

November 28—P. M. Doty, Harvard University, "Present Concepts of Protein Structure."

December 5—B. H. Zimm, General Electric Co., "Recent Advances in Flow Birefringence of Polymer Solutions."

Enrollment applications, if still available, may be obtained from John J. Miskel, Treasurer, Lecture Series Committee, Chas. Pfizer & Co., Inc., 11 Bartlett St., Brooklyn 6, N. Y.

Graphite Welding Reported at National Carbon Ceremony

The development of a technique of "welding" pieces of graphite together and the growing of the largest cadmium sulfide crystals ever reported were two scientific advances revealed by the National Carbon Division of Union Carbide & Carbon Corp. during ceremonies dedicating its new research laboratories at Parma, O., September 18.

Robert G. Breckenridge, director of the laboratories, told the more than 300 scientists, educators, and industrial leaders assembled for the affair that the achievement of a welded graphite suggests the possibility of prefabricating sheets and panels for the assembly of nuclear reactor moderators which now must be built up from graphite blocks.

Graphite is an essential material in nuclear reactors because of its neutron-slowing abilities which make possible the self-sustaining chain reaction necessary in harnessing nuclear energy. One of the crystalline forms of carbon, graphite, when heated to high temperatures at normal atmospheric pressure, vaporizes directly into a gas instead of melting, making welding impossible under these conditions.

Dr. Breckenridge said that National Carbon researchers achieved graphite welding by placing pieces of the material in an atmosphere of argon gas under high pressure. The pieces were brought into contact, and a direct current passed through them. The pieces were then drawn apart slightly, creating an arc that heated the graphite to extremely high temperatures, melting them and permitting welding.

According to Dr. Breckenridge, cadmium sulfide, a light-sensitive material, can be used in photo cells, solar batteries, and, when properly activated, as a light-producing phosphorescent material. The photoconducting properties of single crystals are superior to those of a polycrystalline film. National Carbon researchers produced crystals 3/8-inch in diameter and several inches long.

Other speakers at the dedication ceremonies included James R. Killian, president of Massachusetts Institute of Technology, who talked on "The New Requirements of Education Imposed by Our Advancing Technology." Dr. Killian decried the paucity of students in the fields of metallurgy, biology, geology, aeronautical engineering, mathematics and chemistry.

He suggested new patterns of liaison between the fundamental research activities of universities and the more directed research of industry "so that cross-fertilization may be encouraged while recognizing and protecting the specialized function of each."

Fall Outing at Connecticut

Golf, softball, and horseshoe throwing featured the annual fall outing of the Connecticut Rubber Group at Grassy Hill Park, Derby, Conn., September 8. A Bridgeport area squad took top honors in the softball competition.

James R. Boyle, Armstrong Rubber Co., was chairman of the outing committee, which also consisted of John Coutts, Seamless Rubber Co.; Thomas Zimmerman, R. T. Vanderbilt Co.; and F. J. Rooney, General Electric Co.

Participating in the arrangements of the various events were Al Simon, H. O. Canfield Co.; H. M. Montague, Armstrong Norwalk Rubber Co.; Vin Chadwick, Armstrong Rubber; Dan Dougherty, Godfrey L. Cabot, Inc.; Ray Dudley, Whitney Blake Co.; Tom Skipp, United States Rubber Co.; Francis Burger, Phillips Chemical Co.; George Sprague, B. F. Goodrich Sponge Products Division.

Also Bill Maguire, United Carbon Co., Inc.; R. Van Patten Steiger, Harwick Chemical Co.; Carl Larson, Whitney Blake; Ed Jaroszewski, Armstrong Norwalk; Frank Vile, Accurate Insulated Wire Corp.; Ernie Owens, U. S. Rubber; Jim Steiner, A. Schulman, Inc.; Dave McKean, Whitney Blake; Charles Haynes, National Polychemicals; Tom Fitzgerald, Naugatuck Chemical Division; and Otto Lang, K. B. C. Industries.

Ontario Group Field Day

The Ontario Rubber Section, CIC, held the first meeting of its 1956-57 season with a Field Day at the Dundas Golf & Country Club, Dundas, Ont., Canada, September 7. A record 145 were in attendance, of whom 99 participated in the various golf tournaments.

George Hillebrecht took low gross honors, winning the Canada Carbon Trophy. Chuck Headey and M. F. Malone were tied for lowest net. Other winners included G. Pavaisel, Bob Paterson, Carl Croakman, Stu Murray, B. L. de Joode, Bob Simpson, A. B. Allen, Douglas Bradley, Pete McLuskie, Bert Barraclough, R. A. Clark, W. Leach, B. B. Williams, Jack Marshall, Bob Klingender and M. A. Duncan.

Courses at Rhode Island U

A course in rubber compounding and one in rubber chemistry are under way at the University of Rhode Island, Providence, R. I., and will continue through the fall semester. The courses are being sponsored by the Rhode Island Rubber Club in cooperation with the University's extension division. The rubber chemistry course will survey the new synthetic polyisoprene and polyurethane rubbers, in addition to some plastics and the older rubbers.

Correction

Owing to a mix-up in make-up the names under the pictures of Roger D. Alling and John H. Baldrige, on page 867 of our September, 1956, issue, were transposed. We deeply regret the error and extend our sincerest apologies to Mr. Alling and Mr. Baldrige.

Making Polyurethane Foam

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has licensed Texas Foamed Plastics Corp. to produce polyurethane foam. Under the trade name Gemfoam, the Gonzales, Tex., firm will sell the foam in ten resiliencies and in any shade of the seven basic colors.

Gemfoam will be supplied in rolls, sheets, or slabs in thicknesses from 1/8-inch to 12 inches, and widths up to 48 inches, with greater widths expected to be made available shortly. The services of Du Pont's production laboratory will also be offered by Texas Foamed Plastics.

NEWS of the MONTH

Washington Report and National News Summary

. . . General Services Administration had a number of closely guarded recommendations from its Industry Advisory Committee on the natural rubber stockpile policy under consideration during September.

. . . GSA is conducting a survey of the possible value of the Akron Synthetic Rubber Evaluation Laboratory and Pilot Plant to 24 different federal agencies before offering the facilities to private industry.

. . . The Federal Facilities Corp. took over the responsibilities of the Rubber Producing Facilities Commission on September 24.

. . . The rubber footwear industry, through the Footwear Division of the Rubber Manufacturers Association, pleaded with Congress to take the tariff lead away from the Administration and do something about growing foreign competition.

. . . Two of six major rubber and oil companies accused of violating restraint-of-trade laws by FTC in connection with their sales of tires, batteries, and accessories through retail outlets, began their defense last month.

. . . 1954 Census of Manufactures advance report for the mechanical and associated branches of the industry shows that products valued at $1,677 million were shipped in that year.

Washington Report

Industry Stockpile Recommendations Being Considered; Change in Policy Difficult, Even Though Desirable

Rubber experts of the General Services Administration had a number of closely guarded recommendations under consideration in September which would bring a change in the rotation of the 1.2 million-ton rubber stockpile. The suggestions were deposited with GSA by the 18-man Industry Advisory Committee at a closed meeting in mid-month. Committee members, representing domestic rubber interests and importers, were pledged to strict secrecy. GSA was represented by George Castro, the director of its rubber division.

Informed sources here indicated that none of the suggestions involved the size of the stockpile, although the government had been under pressure within the last year to reduce its inventories to about 900,000 tons, and recent technological improvements in "synthetic natural rubber" threaten to render the entire rubber stockpiling policy obsolete. It was understood that the industry spokesman, in their first meeting with GSA in quite some time, held their fire to the amounts under rotation, requesting a number of changes in this 7-10,000-per-month purchase-and-sell program.

The last onslaught on the rubber stockpile policy was made in the Summer of 1955 when The B. F. Goodrich Co. and Hewitt-Robins, Inc., pleaded with Defense Mobilizer Arthur Flemming that improvements in the adaptability of synthetics to mobilization requirements of the military could justify stockpile reductions of between 200,000 and 300,000 tons. During this period of extremely high prices ODM resisted on the grounds that (1) Congress had set up a difficult system of hurdles on the disposal of any stockpiled item; and (2) nothing could be done before a complete review of the stockpile by the Pentagon. At that time the review was slated to be completed by the end of 1955, but a subsequent ODM decision to do a thorough-going job postponed the completion date for a year.

The present stockpile objective of about 1.2 million tons was reached in December, 1954. Since then, stockpile activity has been limited to rotation, a system of moving older stocks into commercial channels and replacing them with grades at least as good or better. The size of the stockpile, unchanged in almost two years, is based chiefly on the military's needs in the five-year period following mobilization. The goal dates back to 1950 when the now-defunct National Production Authority led a government study of military utilization of rubber in planes, tanks, and other implements of war.

Changes in the strategy for waging war, in the equipment used, and in type of war in which the United States might become embroiled all necessarily have a strong effect on what the Pentagon considers a sufficient inventory. In terms of a nuclear war, the stockpiling concept is already obsolete except in aiding the survival and rehabilitation of this country; in terms of a conventional war, the military feels it should have at least a five-year reserve. Strong consideration must also be given to our ability to produce a stockpiled item domestically—the stockpile concept was borne out of U. S. dependence during wartime for strategic goods like natural rubber produced only in foreign and, sometimes remote, areas of the world.

If the government should find that its present rubber inventory is too large, it will face a ticklish situation in that a decision to reduce it might bring unhappy reactions both at home and in the politically important Far East. Traditionally, the rubber market is a hypersensitive one, and the government's policy makers would have to tread softly to prevent making a lot of enemies and to preclude touching off undesirable economic repercussions.

GSA Takes "Long Road" on Akron Laboratory Disposal

The government's huge purchasing and sales agent, General Services Administration, decided in September to take a cautious attitude toward disposal of the Synthetic Rubber Evaluation Laboratory and Pilot Plant at Akron, O.—an attitude designed primarily to assure full compliance with the disposal law, but one which will necessarily further complicate and prolong an already complicated program.[1]

After considerable study of the law by its legal eagles, GSA decided on a broad interpretation of the mandate to canvass federal agencies having a possible interest in the research facility. As a result, it is waiting for virtually every federal department and major agency—24 in toto—to appraise its organization on the need of the Akron facility. Each will determine if it has such a need—research or any other, including such things as warehousing or office space—and, if one is found, put a value on the property.

When the returns are in, GSA will send them to the Budget Bureau for study, then schedule a round of bid invitations from private industry. The best private offer will have to top the best federal value, or at least come close enough to make it "economically" practicable for Budget to approve a sale to non-governmental interests.

Reasons for Survey

GSA Administrator Franklin G. Floete decided to take the "long road" to preclude any criticism from Congress if the facility is sold to a private organization. He and his legal staff read the law passed in July, authorizing disposal of Akron, as requiring GSA to gather information as to whether there is a substantial federal need of the Laboratory for research or "any other use."

"When all information is in hand," an official explained, "the GSA and the Bureau of the Budget will determine whether the best interests of the United States are served by retaining the facility for use by an agency or by selling the laboratories to private industry."

The Akron disposal program was initially spiced with a unique feature when Congress approved it in July. GSA was directed to conduct the usual canvass of interested agencies, but was directed, as well, to put the Akron facilities up for sale regardless of the agency interest which might be expressed. It was presumed that GSA would reschedule the rather limited canvass conducted earlier by the Congressional committee responsible for this unusual proviso—the Senate Banking and Currency Committee. The Banking unit contacted the Departments of Commerce, Agriculture, and Defense principally and came up with only one expression of interest. Agriculture said it could use the Laboratory in its farm commodity research program, unless the government could get such a good price for the Laboratory-Pilot Plant combined that it would be preferable to use the proceeds for special farm research facilities. Thus the GSA decision to open the canvass to any agency having any use for Akron caught most observers here by surprise.

Akron has been operated since its construction in 1943 and until it went into standby on June 30 by Akron University, under a cost-free contract from Uncle Sam. It consists of 14 buildings having a floor area of more than 53,000 square feet for offices, shops, garage and storage area, and the lab and pilot plant facilities. The six acres of government-owned land on which it rests also include a water treatment pond, a tank farm, and other improvements.

Agencies Canvassed

Questionnaires on possible utilization of this "package" or parts of it went to the Government Printing Office, Central Intelligence Agency, Office of Defense Mobilization, Atomic Energy Commission, Federal Civil Defense Agency, Federal Communications Commission, Federal Power Commission, National Advisory Committee on Aeronautics, Selective Service System, Small Business Administration, Tennessee Valley Authority, Veterans Administration, Home & Housing Finance Agency, Interstate Commerce Commission, and all ten departments: Agriculture, State, Treasury, Defense, Justice, Post Office, Interior, Commerce, Labor, and Health, Education & Welfare.

[1] RUBBER WORLD, Sept., 1956, p. 886.

Footwear Industry Asks Congress to Restore Tariffs

The rubber footwear industry, smarting under a 15% reduction last year in tariffs on competing imports, made an impassioned plea to Congress in September to take the tariff lead away from the Administration and do something about growing foreign competition.

Cornelius P. McFadden, chief of the Footwear Division of The Rubber Manufacturers Association, Inc., took his case to a House Ways and Means Subcommittee headed by Louisiana Democrat Hale Boggs. The Boggs unit invited every interested American industry to comment on how the U. S. foreign trade policy is affecting the economy, as a preview of legislative action in the 85th Congress. The McFadden commentary was both urgent and bitter—urgent on the need of more protection of U. S. footwear producers, and bitter on the lack of representation by this industry in the country's tariff negotiations with the free world.

Trade Policy Changes Urged

"This industry faced disaster from imports produced by cheap labor abroad in the early 1930's," McFadden reminded Boggs. "It was saved when the President, acting under the authority granted by Congress, placed these competitive imports under the American selling price provision.

"Within the past ten years, this industry has moved nearer and nearer to that same brink of disaster as succeeding administrations, acting under authority granted by Congress, have encouraged low-wage producers abroad to again invade the American market by reducing tariffs and breaking down other barriers through administrative rulings."

McFadden argued that the national foreign trade policy should be modified to protect "any and all sound domestic industries—large or small—which may be threatened" by imports because the high standard of living here sets a high pattern of production costs. He said it was impossible for any U. S. manufacturer to give his employes full wage and fringe benefits and still meet competition in home markets from products of low-wage foreign manufacturers.

"Competitive goods are now being offered which are produced by labor receiving less than 10% of the average wage paid in American rubber footwear plants," McFadden claimed.

"We have said consistently in our statements before various Congressional committees over the past several years, that domestic industries in which the labor bill is a substantial part of production costs—such as in the rubber footwear industry—face extinction unless import duties are imposed to give some real measure of compensation for the advantage of cheap labor which lies with the foreign competitor.

"We have argued that sound, well-operated domestic industries—their stockholders, management, and employes—should not be used as pawns in international diplomatic maneuvering.

"We have shown that merely trading jobs — especially when the purchasing power of American jobs is four to twenty times the purchasing power of foreign jobs —instead of contributing to the expansion of world trade, eventually leads it to decline."

McFadden spoke for these 14 of the 21 establishments which produced more than 75 million pairs of rubber footwear, valued at almost $166 million at the manufacturers' level in 1954: Bata Shoe Co., Bristol Mfg. Co., Cambridge Rubber Co., Converse Rubber Co., Endicott Johnson Corp., Goodyear Footwear Corp., Goodyear Rubber Co., Hood Rubber Co. (Division of B. F. Goodrich), LaCrosse Rubber Mills, Mishawaka Rubber & Woolen Mfg. Co., Servus Rubber Co., Tingley Rubber Co., Tyer Rubber Co., and United States Rubber Co.

Industry-Government Liaison Lacking

The American footwear industry depends entirely upon the domestic market. During the 1800's and through the first 20 years of this century, it marketed its products around the world, but since the Twenties it has steadily receded from foreign markets as foreign manufacturers, copying American styles and designs and capitalizing on their wage advantage, moved in with price quotations unmeetable by U. S. producers. For example, McFadden told the Boggs group that U. S. manufacturers had 58.87% of the world export market in 1919. In a little more than ten years the American share of the export market had dropped to 2%; now it is even less, as we export only one-half of 1% of what we manufacture.

McFadden's version of how tariff bar-

riers dating from 1933 have been undermined by the "free trade" policies of every administration since World War II presents an interesting account of how one industry was left completely out in the cold. It ranges from an accusation that it had no idea what U. S. trade experts were negotiating at the 1947 Geneva trade conference, to a confession that to this day it has not "the faintest idea" why the U. S. team made concessions it did at that meeting, to a declaration that it is about time these teams were accompanied by American businessmen more familiar with the commodities under negotiation.

(The 35 member-nations of the General Agreement on Tariffs and Trade, the international trading agreement aimed at lowering tariff barriers, sat down in Geneva on October 11 for their 1956 meeting. Washington officials, however, were predicting that no serious effort would be made to solve any of the eight or ten more serious trade problems, since both major political parties in the U. S. moved toward trade restrictionism in their platforms for the Presidential campaigns.

(One observer referred to the current eleventh session of GATT as "a gatt with a silencer on it." However, the agenda includes another look at the "French plan" for reciprocal tariff reductions of up to 30% over a three-year period. This was the basis for the round of tariff reductions agreed to last year, when the U. S. reduced rates on rubber footwear and hundreds of other items by 15%—5% annually for three years.)

McFadden complained particularly of Washington's refusal to talk over his industry's problems informally and away from the prying ears and eyes of those representing foreign competitors. In being forced to testify at public hearings preliminary to tariff negotiations, he said, the industry was giving the foreign governments concerned ample time to work up counter-arguments for the negotiating sessions.

"On the one-hand [our side]," he told the Boggs group, "these negotiations are open to the public. On the other hand, the interested American industries have virtually no knowledge of what goes on [in Washington], what is being asked of them, or what factors influence the final decisions. It is our understanding that other parties to these international conferences include representatives of domestic business and industry in their delegations with full powers and privileges of delegates.

"This point is made not necessarily as a reflection on the abilities of the governmental representatives the U. S. sends to the conferences, but it is too much to expect that they would be as well-equipped to determine how an industry would be affected by a tariff concession as would be officials of the industries concerned. . . .

"Restore the authority over tariffs and trade to the place where the responsibility still lies—the Congress of the United States."

TBA Merchandising Hearings Begin before FTC Examiners

The first pair of six major rubber and oil companies went to work in September to disprove Federal Trade Commission charges that their "overriding commissions" on tires, batteries, and accessories sold through retail service stations violate the federal laws prohibiting restraint of trade. The B. F. Goodrich Co. and Texas Co., paired off in the first of three complaints to come up for hearing before the Commission, agreed to a schedule of hearings expected to carry into late fall and to take place in several major cities, including Washington.

Accusations and Denials

Goodrich and Texas, plus Goodyear Tire & Rubber, Firestone Tire & Rubber, Shell Oil, and Atlantic Refining, were accused in January of violating the Federal Trade Commission Act by the payment—on the part of the rubber companies—and the collection—on the part of the oil companies—of "overriding commissions" paid on TBA items sold through stations marketing products of the three oil companies.[2]

All of the accused denied the allegations in answers filed with FTC in April, chiefly on the ground that the commissions were paid for normal sales promotion services rendered by the oil companies. Firestone defended the so-called "sales commission plan" as promoting TBA competition "at all levels of competition" and as "beneficial to all segments of the economy, in the public interest, and an economical and efficient method of marketing."

FTC, however, contends that the oil companies contracted with Firestone, Goodrich, and Goodyear "to influence unduly their controlled service stations and distributors" to buy TBA items manufactured by the rubber companies. Oil company answers to this charge centered principally on the contention that dealers have not been coerced into handling the TBA products involved, and that the sales commission plan is a legitimate form of sales promotion.

Atlantic laid particular emphasis on the well-being of its dealers in this highly competitive field and tied in the dealers' well-being with its own. This company argued that it could not compete effectively with other oil companies "unless dealers purchasing Atlantic's petroleum products are competitive at the retail level, and many of such dealers cannot compete successfully unless the TBA component of their retail business is competitive with the TBA selling activity of their retail competitors."

Decision Long Way Off

At this early date in the FTC-industry conflict over TBA items, nobody was willing to predict when a final Commission decision might come, but it's clear that it's a long way off. Goodrich and Texas attorneys exchanged a batch of non-controversial correspondence with FTC attorneys at a one-day hearing in September, and the parties get down to serious business at a week of hearings beginning October 15 here in Washington. New York, Chicago, Akron, and Dallas were mentioned as other cities where the presiding FTC examiner might have to take the case before the hearing stage is concluded.

The examiner, Earl Kolb, will then follow the normal procedure of accepting wrap-up briefs before filing a recommended decision with the Commission. Long before this case nears a final decision, however, examiner Kolb will schedule hearings on the two related complaints against Goodyear, Firestone, Shell, and Atlantic. The chances are better than 50-50 that the Commission will decide to hold its decision on the first case completed until it can rule simultaneously on all three.

[2] *Ibid.*, Feb., 1956, p. 684.

FFC Solicits Louisville Butadiene Plant Lease Bids

Federal Facilities Corp. announced on September 25 that proposals to lease the government-owned alcohol-butadiene plant at Louisville, Ky., would be received during the period ending October 31. All such proposals shall be subject to the existing lease with Publicker Industries, Inc., which will expire April 4, 1958, and shall be for a term of not less than five years or more than 15 years from the date of termination of the existing lease.

Upon receipt of proposals, FFC will enter into lease negotiations for a period of not less than 30 days from October 31 with those submitting the proposals. The date of termination of such negotiations will be determined by FFC and announced to all eligible bidders.

This plant produces butadiene from ethyl alcohol and has an annual capacity of 87,000 short tons. The leasing of these facilities is authorized by Public Law 433, 84th Congress. The Attorney General is required to pass on any FCC recommendation for lease from the standpoint of the anti-trust laws.

It will be recalled that one of the last acts of the former Rubber Producing Facilities Disposal Commission was an attempt to get Congressional approval for the sale of this Louisville plant to Union Carbide & Carbon Corp. in June of this year. The RPFDC recommendations in this connection were rejected by Congress, and new legislation was passed in which the further efforts at disposal were assigned to FFC.

FFC Takes over for RPFDC

President Eisenhower issued a tersely worded, formal order in September dissolving the Rubber Producing Facilities Disposal Commission and naming the Federal Facilities Corp. to take over its remaining responsibilities, effective September 24. In its almost three years of operation under Chicago Banker Holman D. Pettibone, the Commission sold 26 of 27 government-owned synthetic rubber plants and miscellaneous equipment for $284,848,000 and leased the remaining plant to a private firm until April, 1958.

FFC, which operated the synthetic rubber plants for the government's account prior to their disposal, will administer all matters involving the Commission, including the continuing provisions of four mortgage contracts sold by the Commission and the language in every disposal contract

requiring that the facilities be available for synthetic rubber production for ten years after purchase from the government.

FFC will also administer the lease with Publicker Industries at the alcohol-butadiene plant at Louisville, Ky., and the lease under which Davison Chemical Co. stores related catalyst equipment at Baltimore, Md. In addition, the agency inherited the Commission's authority to re-lease the Louisville plant.

"All matters placed under the administration of FFC by the executive order," the White House announced, "will be subject to direction and control by the Secretary of the Treasury."

RPFDC was created by the Rubber Producing Facilities Disposal Act of 1953 to dispose of the synthetic rubber facilities still in government hands when President Eisenhower took office. Sale of the 26 plants transferred to private industry, plus miscellaneous equipment, returned $284,848,000 to the Treasury, exceeding the government's remaining net investment in the synthetic rubber program by $25,885,000.

Mr. Pettibone and his two colleagues on the Commission, Banker Leslie R. Rounds of Maine and Businessman Everett R. Cook of Tennessee, left the Washington scene early in the summer, expecting to return for another try at selling the Louisville plant. At the last minute, however, Congress backed off from tentative plans to put it up for sale next year.

National News

1954 Census of Manufactures Advance Report; Rubber Industries, Not Elsewhere Classified

The advance report of the 1954 Census of Manufactures for "Rubber Industries, Not Elsewhere Classified," which means almost everything except tires and tubes, footwear, and reclaimed rubber, was issued in September. Previous advance reports for the footwear,[1] tires and tubes,[2] and reclaimed rubber industries[2] appeared in previous issues. As with the other branches of the industry, the figures for 1954 do not properly represent the growth of the industry since 1953 and 1955 provide more representative figures, but the Census of Manufactures is planned well in advance and occasionally may be made during a period of reduced activity.

During 1954, manufacturers in the n.e.c. branch of the industry shipped products valued at $1,677 million, an increase of 77% over 1947 figures, according to the Bureau of Census. Average employment increased 19% to a total of 133,400 employes in 1954, and value added by manufacture amounted to $930 million, an increase of 79% over the 1947 value.

The n.e.c. classification represents manufacturing establishments engaged primarily in the manufacture of industrial and mechanical rubber goods, rubberized fabrics and vulcanized rubber clothing, and miscellaneous rubber specialties and sundries. Establishments primarily engaged in rebuilding and retreading tires for the trade or for sale at wholesale are included in the n.e.c. classification, but the rebuilding or retreading of rubber tires by tire-repair shops is classified in Service Industries.

The value of shipments, as reported in the n.e.c. category, consisted of products described above as primary to the industry, but also included the value of secondary products (which are primary to other industries). In Tables 1 and 2[3] the $1,667 million total value of shipments reported in the n.e.c. industry, S. I. C. Code 3099, consisted of $1,664 million manufactured products and $13 million miscellaneous receipts for contract work, repair work, sales of scrap, etc. The $1,664-million product shipments were accounted for by $1,456 million of rubber goods, n.e.c., and $208 million of products primary to other industries (e.g., rubber footwear, tires and tubes, fabricated plastic products, n.e.c., molded plastic products, resin coated fabrics, vinyl and polyethylene film and sheeting, raincoats and other waterproof outer garments, gaskets, covered rubber thread, sporting and athletic goods), thus, the industry's shipments of rubber goods, n.e.c., represented 87% of its total manufactured product shipments (primary and secondary). This figure describes the "primary product specialization ratio," that is, the extent to which plants classified in an industry "specialize" in making products regarded as primary to the industry. The 1947 primary product specialization ratio for the industry was 85.

The Census Bureau also points out that the industry's total value of shipments should be clearly distinguished from the total value of primary products of the industry shipped by all producers. The latter figure appearing in Table 3[3] indicates that $1,744 million value of rubber products, n.e.c., and other products primary to industry 3099 was shipped by all producers. Of this total 83% was shipped by plants classified in industry 3099; while the remainder was shipped as secondary products by plants classified in other industries. The figure 83% is known as the "coverage ratio," that is, it measures the extent to which all shipments of primary products of an industry are "covered" by plants classified in that industry, as distinguished from secondary producers elsewhere.

[1] *Ibid.*, Apr., 1956, p. 98.
[2] *Ibid.*, May, 1956, p. 261.
[3] *See pp.* 100-101.

RMA Flooring Division Design Awards Competition

In order to promote broader use of rubber flooring in institutional and commercial-type buildings, the RMA Rubber Flooring Division announced plans recently for sponsoring a national Rubber Flooring Design Awards competition.

The contest will run from September 1, 1956, through August 31, 1957, and is open to professional designers, architects, decorators, and floor installers within the continental United States. A Designer's Award and $1,500 will go to the winner; and an Installer's Award and $500 will go to the flooring contractor who installs the prize-winning floor.

Winners will be selected by a panel made up of the three following authorities in the architectural and design fields: Leon Chatelain, Jr., of Washington, D. C., president of the American Institute of Architects; Marc T. Nielsen, of Chicago, Ill., president of the American Institute of Decorators; and John Shear Knox, editor-in-chief of *Architectural Record*. The competition is pointed at according national recognition to persons "who have been instrumental in broadening the horizon of floor design through the use of tasteful and functional patterns created in rubber."

The following eight RMA member companies and two non-member companies engaged in the manufacture of rubber flooring are cooperating in sponsoring the competition: American Biltrite Rubber Co., Danbury Rubber Co., Inc., Goodyear Tire & Rubber Co., The B. F. Goodrich Co., Kleistone Rubber Co., Inc., Hewitt-Robins, Inc., R. C. A. Rubber Co., and Kentile, Inc. The other supporting companies are American Rubber Corp. and Robbins Flooring Products, Inc.

RMA and Carriers Favor Present Rubber Handling

The Rubber Manufacturers Association through its traffic committee and the members of the Inward Far East Lines through its New York Committee have taken the position that present methods of handling and discharging natural rubber at the Port of New York should continue until all parties concerned can reach an agreement on use of the proposed new centralized rubber terminal on Staten Island.

While final papers have yet to be signed, R. D. Young, head of the newly organized Rubber Terminal Corp., and Marine and Aviation Commissioner Vincent O'Connor announced recently that agreement had been reached between the Corporation and the City of New York on establishment of a centralized rubber importing terminal at city-owned piers 12 and 13 on Staten Island for handling an estimated $318,000,000 in rubber imports reaching New York annually. The Corporation had at one time con-

Table 1.—GENERAL STATISTICS FOR THE RUBBER INDUSTRIES, N.E.C., IN THE UNITED STATES: 1954 AND 1947

(Standard Industrial Classification Code 3099)

Item	Unit of measure	1954	1947*	Percent change 1947-1954
Establishments	Number	1,314	774	+70
All employees:				
Number	Thousands	133.4	112.4	+19
Payroll	Million dollars	543.8	311.0	+75
Production workers:				
Number	Thousands	104.6	94.1	+11
Man-hours	Millions	205.7	185.3	+11
Wages	Million dollars	382.4	237.6	+61
Value added by manufacture[1]	....do.	930.2	518.7	+79
Cost of materials, fuel, electricity, and contract work[2]	....do.	746.7	436.4	+71
Value of shipments[3]	....do.	1,676.9	945.3	+77
Capital expenditures, new	....do.	55.6	47.1	+18

*Revised.

[1]For 1954, value of shipments less cost of materials, supplies, fuel, electric energy, and contract work. For 1947, estimated value of production was used in the calculation, in place of value of shipments. If the 1947 value added figure had been calculated on the basis of value of shipments (rather than estimated value of production, as was the case), the 1947 "value added by manufacture" for this industry would have been $508.9 million.

[2]Excludes cost of products bought and resold in the same condition.

[3]Includes, for all establishments classified in this industry, not only (a) their value of products "primary" to the industry, but also (b) their value of "secondary" products, which are primary to other industries, and (c) their "miscellaneous receipts" for repair work, sales of scrap, installation of own products, etc. Excludes sales of products bought and resold in the same condition.

Table 2.—GENERAL STATISTICS FOR THE RUBBER INDUSTRIES, N.E.C., INDUSTRY (S.I.C. CODE 3099), BY REGIONS AND SELECTED STATES: 1954 AND 1947

Region and State[1]	1954										1947*	
		All employees		Production workers			Value added by manufacture[2]	Cost of materials etc.[3]	Value of shipments[4]	Capital expenditures, new	All employees, number	Value added by manufacture[2]
	Establishments, number	Number	Payroll ($1,000)	Number	Man-hours (1,000)	Wages ($1,000)	($1,000)	($1,000)	($1,000)	($1,000)		($1,000)
United States, total[5]	1,314	133,370	543,771	104,646	205,681	382,429	930,243	746,681	1,676,924	55,601	112,385	518,682
New England	189	27,311	108,542	21,504	42,859	75,721	192,073	161,979	354,053	9,103	20,645	98,336
Massachusetts	103	14,890	59,432	11,579	23,031	40,523	108,885	101,552	210,438	4,719	10,472	53,271
Middle Atlantic	284	27,727	113,145	21,360	42,034	77,949	190,773	142,056	332,830	7,405	27,849	129,415
New York	105	6,950	27,823	5,199	10,364	18,556	49,381	37,015	86,396	1,925	5,277	25,300
North Central	458	57,635	243,249	45,601	88,392	173,527	405,793	320,282	726,076	25,522	49,783	222,230
Ohio	169	30,535	132,042	24,007	45,461	93,206	214,007	168,082	382,089	14,552	32,770	(D)
South	164	9,161	29,906	7,527	14,486	21,875	57,808	55,702	113,511	5,819	(D)	(D)
Delaware	4	1,236	4,163	1,028	1,486	2,897	6,960	7,332	14,293	162	(D)	(D)
Maryland	13	1,893	5,818	1,573	3,280	4,143	9,064	8,377	17,442	658	563	(D)
Virginia	12	1,091	3,606	837	1,647	2,424	7,388	7,066	14,455	595	667	(D)
North Carolina	18	1,178	3,970	964	1,889	3,114	9,572	6,802	16,375	(D)	(D)	(D)
Mountain	12	4,570	20,665	3,306	7,552	15,028	34,245	24,462	58,707	3,123	(D)	(D)
Pacific	207	6,964	28,262	5,347	10,355	18,326	49,549	42,198	91,747	4,627	3,465	(D)
California	184	6,601	26,561	5,096	9,851	17,354	46,071	39,642	85,713	4,461	3,304	14,699

*Revised.

D Withheld to avoid disclosing figures for individual companies.

[1]Each producing State not shown separately has been withheld either (a) to avoid disclosing figures for individual companies; or (b) because the State had less than 1,000 employees in the industry. (Additional publishable detail will appear in the final Census bulletin for this industry.)

[2]For 1954, value of shipments less cost of materials, supplies, fuel, electric energy, and contract work. For 1947, estimated value of production was used in the calculation, in place of value of shipments. If the 1947 value added figure had been calculated on the basis of value of shipments (rather than estimated value of production, as was the case), the 1947 "value added by manufacture" for this industry would have been $508.9 million.

[3]Includes cost of materials, fuel, electricity, and contract work, excludes cost of products bought and resold in the same condition.

[4]Includes, for all establishments classified in this industry, not only (a) their value of products "primary" to the industry, but also (b) their value of "secondary" products, which are primary to other industries, and (c) their "miscellaneous receipts" for repair work, sales of scrap, installation of own products, etc. Excludes sales of products bought and resold in the same condition.

[5]Sum of regional figures may not equal U. S. total, due to independent rounding.

Table 3.—QUANTITY AND VALUE OF RUBBER INDUSTRIES, N.E.C., BY ALL PRODUCERS IN THE UNITED STATES: 1954 AND 1947

(Includes value of these products reported both by establishments classified in the Rubber Industries, N.E.C., Industry, and by those establishments making these items as "secondary" products in other industries)

Product code	Product	Unit of quantity	Total shipments including interplant transfers			
			1954		1947	
			Quantity	Value ($1,000)	Quantity	Value ($1,000)
3099---	Rubber products, n.e.c., total	.....	xxx	[1]1,743,519	xxx	*985,744
30991	Camelback and tire repair materials	.....	xxx	107,995	xxx	42,714
3099111	Camelback	Thousand pounds..	310,951	83,514	96,284	24,221
3099151	Tire sundries and repair materials	.....	xxx	24,481	xxx	18,493
30992	Heels and soles, rubber and elastomer resin	.....	xxx	113,088	xxx	72,175
3099211	Heels	Dozen pairs.....	19,644,496	37,907	26,468,574	31,028
3099231	Soles	....do.....	12,121,192	48,242	9,778,549	31,231
3099251	Soling slabs and toplift sheets	Thousand sq. ft..	141,981	26,939	48,755	9,916
30993	Mechanical rubber goods	.....	xxx	1,100,459	xxx	*614,064
	Belts and belting:					
3099311	Conveyor and elevator	Thousand pounds..	48,039	40,631	56,152	37,195
	Transmission:					
3099313	Flat	....do.....	10,516	14,593	29,460	26,132
	V-belt:					
3099315	Motor vehicles	....do.....	[2]13,378	18,292	21,547	21,083
3099317	Industrial and all other (including standard, notched, and segment)	....do.....	35,803	48,131	33,573	40,784
3099319	Other rubber belts and belting	....do.....	5,687	5,285	(NA)	3,588
	Hose:					
	Railroad specification:					
3099321	Airbrake and air signal	....do.....	1,528	1,292	4,030	2,686
3099323	Other	....do.....	8,197	2,946	(NA)	1,073
	Molded:[3]					
3099325	Garden	....do.....	21,918	9,212	79,940	19,056
3099326	Horizontal wire braided	....do.....	14,184	14,562	(NA)	24,667
3099327	Other rubber	....do.....	70,863	40,590		
	Wrapped:					
3099328	Handbuilt	....do.....	16,954	15,908	13,077	9,082
3099329	Other	....do.....	27,505	23,241	(NA)	25,968
	Cotton rubber lined:					
3099331	Fire-specification	....do.....	4,074	3,880	6,848	6,271
3099332	Fire-commercial grade	....do.....	4,483	4,866	3,502	3,159
3099333	Other	....do.....	5,141	5,399	(NA)	3,103
3099335	Gasoline	....do.....	7,150	6,848	8,703	6,269
3099337	Other rubber hose	....do.....	1,240	10,138	(NA)	14,068
3099338	Tubing (except reinforced)[3]	....do.....	19,554	9,627	21,327	7,382
	Hard rubber mechanical goods:					
3099341	Battery jars, boxes and parts	.....	xxx	23,653	xxx	25,030
3099345	Other hard rubber mechanical goods	.....	xxx	21,217	xxx	12,099
	Sponge rubber:					
	Latex foam:					
3099351	Automobile seating	Thousand pounds..	51,747	40,248	14,637	14,356
	Upholstery:					
3099352	Fully molded cushions	....do.....	35,024	30,377	3,950	4,568
3099353	Slab stock	....do.....	18,488	15,804		
3099354	Mattress cores (excluding children's and infants' mattresses and pads and hospital padding)	Thousand units...	835	19,009	29	617
3099355	Pillows	....do.....	7,184	16,876	(NA)	11,056
3099356	Other latex foam products, including hospital padding	Thousand pounds..	51,210	23,754		
3099358	Chemically blown sponge	....do.....	66,383	30,230	*41,988	*19,962
	Floor and wall coverings, rubber:					
	Mats, mattings and stair treads:					
3099361	Rolls	Thousand sq. yds.	10,668	16,291	(NA)	34,890
	Individual mats:					
3099362	Automotive	....do.....	38,773	34,641		
3099363	All others (including stair treads)	....do.....	8,013	11,870		
	Other flooring:					
3099365	Sheet goods	....do.....	1,511	2,091	5,178	14,314
3099366	Tile	....do.....	11,670	22,319		
3099368	Wall coverings (including cove base, wainscotting, etc.)	....do.....	9,336	5,232	xxx	xxx
	Molded and extruded goods, rubber:					
3099371	Molded (including wringer rolls and excluding extruded, sponge, and hard rubber)	Thousand pounds..	197,513	171,217	[4]112,860	[4]70,963
3099373	Extrusion and lathe cut (except tubing)	....do.....	93,012	48,946	54,735	23,955
3099374	Jar rings	Gross.....	(NA)	2,738	(NA)	2,892
3099375	O-rings	Thousand pounds..	5,392	11,852	(NA)	([5])
3099376	Packing rubber (for sealing moving parts excluding molded and lathe cut goods)	....do.....	31,886	28,477	17,664	12,451
3099377	Rubber pressure sensitive tape, including friction[3]	....do.....	25,953	18,174	35,711	16,516
3099378	Tiring	....do.....	(NA)	([5])	(NA)	[6]6,909
3099381	Rolls and platens, solid and covered rubber (excluding wringer rolls and printer's rolls)	.....	xxx	12,557	xxx	* [4]11,110
3099383	Tank blocks, treads and band tracks	.....	xxx	43,256	(NA)	([5])
3099385	Fuel cells	.....	xxx	67,854	xxx	([5])
3099387	Boats, pontoons and life rafts, rubber	.....	xxx	15,128	xxx	([5])
3099398	Other mechanical rubber goods, except hard rubber	.....	xxx	[3]91,207	xxx	* [3]80,820

For footnotes, see end of table.

Table 3.—QUANTITY AND VALUE OF RUBBER INDUSTRIES, N.E.C., BY ALL PRODUCERS IN THE UNITED STATES: 1954 AND 1947—Continued

Product code	Product	Unit of quantity	Total shipments including interplant transfers			
			1954		1947	
			Quantity	Value ($1,000)	Quantity	Value ($1,000)
3099---	Rubber products, n.e.c.—Continued					
30994	Druggist and medical sundries	.....	xxx	46,776	xxx	*35,133
3099411	Water bottles, fountain syringes, and combinations	Gross	46,186	7,042	49,483	4,893
3099431	Nipples and pacifiers (excluding nursing units)[3]	....do	667,838	3,702	1,016,253	7,777
	Gloves, rubber, rubberized and rubber lined:					
3099451	Household	Dozen pairs	1,123,553	5,721	604,297	1,963
3099461	Surgical	....do	1,551,610	5,365	1,165,269	2,503
3099471	Other (including ice bags and caps, prophylactics, medical, dental, and surgical), rubber[3]	.....	xxx	24,946	xxx	17,997
30995	Other rubber products, n.e.c.	.....	xxx	370,982	xxx	*215,854
	Coated fabrics:					
	Rubber and synthetic rubbers:					
3099511	Automotive decking	Thousand sq. yds	2,988	1,992	4,796	3,347
3099514	Garment fabrics	....do	12,650	4,902	6,493	2,263
3099515	Hospital and crib sheeting	....do	5,237	3,335	4,180	2,999
3099516	Shoe and slipper fabrics	....do	19,229	12,568	17,783	8,889
3099517	Other coated fabrics (including automotive and furniture upholstery)	....do	37,883	22,900	30,721	18,491
3099531	Factory rebuilt or retreaded tires	Thousand tires	(NA)	30,159	257	[7]1,955
	Rubber clothing (finished):[8]					
3099541	Gloves, industrial	Dozen pairs	754,107	8,295	(NA)	4,645
	Rainwear and outer garments (raincoats, capes, mackintoshes etc.):[9]					
3099543	Men's and boys'	Dozen	(NA)	([10])	(NA)	5,769
3099545	Women's, misses', and juniors'	....do	(NA)	([10])		
3099551	Aprons, rubber, except rubberized	....do	9,511	214	(NA)	[9] [12]7,056
3099553	Baby pants, rubber[11]	....do	794,370	3,992	2,591,680	*8,423
3099555	Bathing and shower caps, rubber[11]	Gross	74,820	4,387	73,306	3,243
3099557	Bibs and dress shields, rubber	....do	xxx	([10])	xxx	([12])
3099559	Other rubber clothing	.....	xxx	289	xxx	([10])
3099561	Thread, rubber, bare	Thousand pounds	11,468	18,101	* [13]12,897	* [13]19,537
3099563	Cement, rubber (for sale as such)	Thousand gallons	136,868	54,542	17,650	20,982
3099567	Balloons, rubber (toy and advertising)	Gross	6,566,777	9,076	7,382,491	9,865
3099571	Stationers' rubber bands	Thousand pounds	5,834	5,517	3,949	3,058
3099575	Erasers, except pencil plugs	....do	3,364	2,927	1,886	2,203
3099579	Balls, rubber (except bowling balls)	.....	xxx	5,724	xxx	10,854
3099581	Toys, rubber, except ballons, balls, and dolls	.....	xxx	13,166	xxx	5,105
3099589	Gutta-percha products	.....				
3099598	Other rubber products, including rubber brushes, combs, mouth pieces, unsupported film, etc	.....	xxx	[10]168,896	xxx	[10]77,170
3099000	Rubber products, not specified by kind	.....	xxx	4,219	xxx	5,804

*Revised.
xxx Not applicable.
NA Not available.
[1]Of this total value, 83 percent was shipped in 1954 by plants classified in the Rubber Industries, N.E.C., Industry; the remainder was shipped as "secondary" products by plants classified in other industries.
[2]The quantities produced are 13,644,000 pounds or 29,341,000 units.
[3]The 1954 data exclude quantities of plastic products, classified as primary to Industry 3971, whereas the 1947 figures include such quantities which may not be shown separately without disclosing figures of individual companies. Data for plastic hose will appear with the statistics for Industry 3971, Plastic Products, not elsewhere classified.
[4]Data for wringer rolls included with rolls and platens.
[5]Included in figures for "Other Mechanical Rubber Goods," code 3099398.
[6]Includes data for solid and cushion tires, less than 2.00 inch, including juvenile, toy and baby carriages, etc., now coded as primary to Industry 3011, Tires and Tubes.
[7]Not directly comparable with 1954 data because a number of retreading plants were not classified as manufacturing establishments in 1947.
[8]Additional data are shown in Major Group 23, Apparel and Other Finished Products.
[9]For additional detail see Industry 2385, Raincoats and Other Waterproofed Outer Garments. The 1947 figures represent all rainwear made by plants classified in Major Group 30, Rubber Products. In 1954, plants classified in Major Group 30, shipped $9,530,000 of rainwear, classified in Industry 2385.
[10]Included in figures for "Other Rubber Products," code 3099598.
[11]The 1947 data include figures for rubberized and plastic products made by establishments classified in the Major Group 30, Rubber Products.
[12]Data for bibs and dress shields, plastic and rubberized, included in total for "Aprons," code 3099551.
[13]Includes data for covered thread made and shipped by plants classified in Major Group 30, Rubber Products.

sidered locating a centralized terminal in the Port of Newark. Mr. Young is also president of the Rubber Trade Association of New York.

Members of the Inward Far East Lines have objected to proposals to use a centralized terminal. They have informed both the City and the Corporation that they "see no reason whatsoever to disturb the present method of discharging rubber in this port," and added, "we go further than that by stating to you at this time that we feel the use of a centralized rubber terminal will involve heavy financial losses to the carriers, and we believe also to importers because of the impracticability of this entire plan."

The Corporation has taken the position, however, that use of a centralized terminal would make for more efficient, economic, and expeditious handling and inspection of incoming cargoes. The carriers argue that it would mean extra cost in shifting a vessel in port with added exposure to danger as well as additional costs in handling rubber and loss of vessel time.

The RMA Committee pointed out that "without delving into the ramifications of such a centralized terminal, we believe that until your members can concur or reach a mutual understanding in the Rubber Terminal Corp. arrangements of handling rubber that all concerned will best be served through continuation of present methods of discharging and handling crude rubber at the Port of New York. This is not to be construed that we are unfavorable to a centralized rubber terminal, but rather that all parties concerned should have an amicable understanding in such an important undertaking before any definite action is taken."

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National Carbon Co., division of Union Carbide & Carbon Corp., New York, N. Y., is conducting a basic research program on the mechanism of catalysis through the study of solid state physics, including such catalystic action as is being used in the manufacture of synthetic rubber.

Other Industry News

Esso Makes All-Butyl Tire; Enjay Unveils Lab Building

The successful production under pilot-plant conditions of all-butyl passenger tires has been announced by Esso Research & Engineering Co., New York, N. Y. The tires are reported to have several advantages over the SBR-natural rubber passenger tires now in use.

Among these claimed advantages are smoother riding, lower noise level, immunity to atmospheric and chemical cracking, faster stopping on dry and wet pavement, and better air-holding properties. Little mention is made of the much-publicized longevity of the butyl tire.

As an expression of confidence in the still-experimental butyl tire and in the future of butyl rubber generally, the company recently built a new 25,000-square-foot polymer laboratory at the Linden, N. J., facilities of Enjay Co., Inc., which it owns.

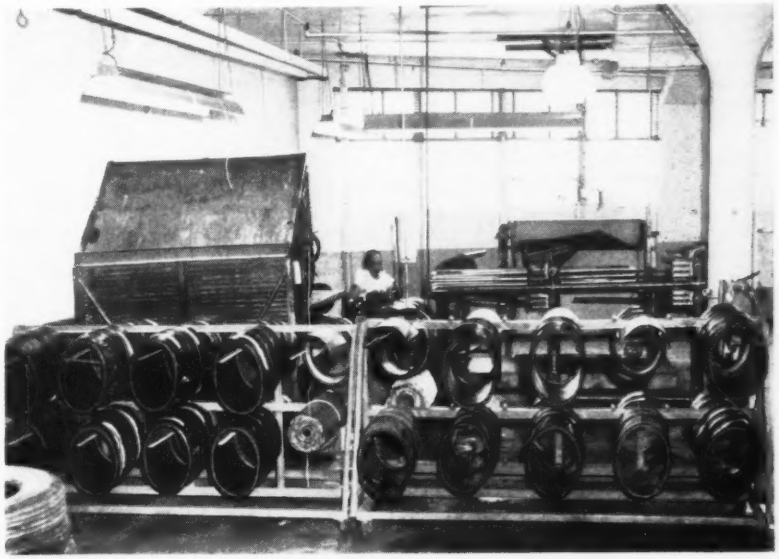
Enjay has been marketing butyl rubber since the Spring of 1955, when two affiliated companies, Esso Standard Oil and Humble Oil & Refining, bought the nation's two existing butyl plants from the Federal Government. The butyl manufacturing process is patented by Esso Research.

Unveiled to the press on September 18, one day after the announcement of the butyl tire, the L-shaped Linden laboratories were shown to duplicate closely butyl processing in the factory. In evidence were a wide variety of mills, mixers, calenders, extruders, weighing devices, and vulcanization equipment. Much of the building's floor tile and power cable insulation were made of butyl.

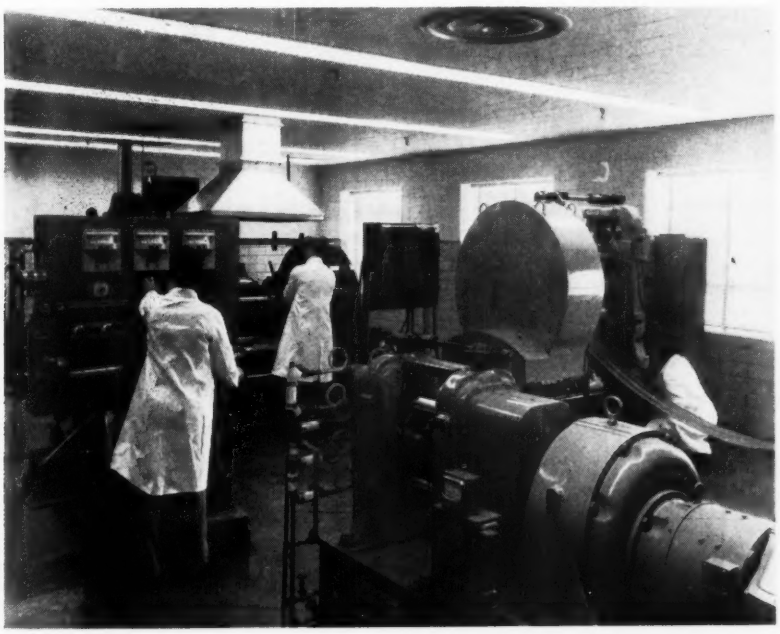
An Enjay executive said that the all-butyl passenger tire, when in commercial production, would sell for about as much as a conventional premium tire.

The previous Esso Research announcement attributed the development of the all-butyl tire to the perfection of a butyl latex. The emulsified btuyl and water was said to have permitted for the first time the bonding of butyl rubber with tire cord on existing plant equipment.

The new tires are being produced in a pilot plant at the Armstrong Tire Co., West Haven, Conn. Esso Standard Oil Co., which is affiliated with Esso Research, is planning to test-market a limited number of all-butyl tires in about five months. At that time about 100 of the tires will be produced daily.



A portion of the pilot plant for the production of all-butyl tires operated by Esso Research & Engineering Co. at Armstrong Tire Co., West Haven, Conn.



Mixing, calendering and extruding equipment in Enjay's new polymer lab

It was stated that two large automobile manufacturers have asked their tire supplying rubber companies to provide a reasonable number of butyl passenger-car tires for trial on the 1957-model cars.

The man who headed up the development work on the all-butyl passenger tire was revealed as Donald J. Buckley, who has been with Esso Research since 1942. Buckley emphasized that the project has been a "group effort" with nine fellow scientists contributing to the tire development work.

Esso Research is also working on the development of all-butyl bus, truck, and aircraft tires and emphasized the vital significance to the United States of all-butyl tires in times of an emergency when the supply of natural rubber from abroad might be cut off.

Monsanto Chemical Co., plastics division, Springfield, Mass., has increased the price of its acrylonitrile by 1¢ a pound to 28¢ a pound in tank-car quantities, f.o.b. the company's Texas City, Tex., plant.

BFG Discovery Speeds Up Synthetic Latex Production

A process for producing synthetic rubber latex 2½ times as fast as conventional methods has been developed by B. F. Goodrich Sponge Products division, Shelton, Conn.

The technique makes possible an output of 15,000 pounds of dry polymer per reactor per day in reactors with conventional agitation and cooling, according to F. M. Daley, division president. By current methods, latex reactors equipped with special high-power agitation and cooling produce about 6,000 pounds a day.

Leon Talalay, technical director of Sponge Products' Texfoam division, is credited with discovery of the new technique. He has applied for patents and assigned the rights to The B. F. Goodrich Co., Akron, O., which is offering the process to other manufacturers under a uniform licensing arrangement. Polymer Corp., Sarnia, Ont., has already been licensed.

The raw material for the Talalay process is a small-particle size but low-solids-content latex similar to that now produced by the synthetic rubber industry in making general-purpose rubber for tires and other rubber products.

The small latex particles are converted to large particles by an instantaneous method known as freeze agglomeration. This allows the latex to be concentrated to a fluid product of high-solids content and advantageous properties particularly suited to the manufacture of latex foam for upholstery, bedding, and other uses.

Present processes for producing the larger-particle-size latex, Mr. Daley said, are cumbersome and costly because of the lengthy reactor time required. He estimated that the entire cost of the Talalay process of agglomeration and concentration is less than 2¢ per pound of dry rubber content.

Plan Wider Distribution of Federal Research Reports

The results of unclassified federal-supported basic scientific research will be made more widely available in a joint effort of the National Science Foundation, the Library of Congress, and the Office of Technical Services of the United States Department of Commerce.

In making the announcement, Alan T. Waterman, NSF director, said the three organizations would undertake wider dissemination of significant information in some 20,000 unclassified technical reports on basic research issued annually by organizations engaged in government-sponsored scientific research.

To be called Government Research Information, the program is designed to assist research scientists in three ways:

The NSF will tell them, when requested, what unclassified reports on government research are being issued in a specific field of interest and how to obtain them. Such requests should be directed to the Government Research Information Clearinghouse, National Science Foundation, Washington 25, D. C., attention of Dwight E. Gray.

It will allow them to obtain, on a subscription basis, a report-announcement service to keep them informed automatically on the bulk of such reports. The service will be an expansion of the publishing of "U. S. Government Research Reports" by OTS through the supplemental support of NSF. Details of the announcement service is available from the Office of Technical Services, Department of Commerce, Washington 25, D. C., attention of John C. Green, Director, or from the National Science Foundation Clearinghouse.

Finally, it will allow them to obtain access to a well-catalogued reference collection of such federal research reports. This will be offered by the science division of the Library of Congress. In general, any report in this open collection can be purchased from OTS or, in photoreproduced form, from the Library, or may be personally examined at the Library. Information on this service can be obtained from the Science Division, Library of Congress, Washington 25, D. C., attention of John Sherrod, Acting Chief, or from the NSF Clearinghouse.

Israeli Tours Wellco Plant

The general manager of a foreign footwear manufacturing firm whose percentage of coverage of a competitive market is said to be unequalled by any other company in the world has toured the plant headquarters of Wellco-Ro-Search, Waynesville, N. C., to study recently developed equipment and techniques.

The visiting executive is Dov Gafni, of Hamgaper, an Israeli firm that annually produces and sells almost one million pairs of shoes to a domestic market. Israel's population is approaching two million.

Hamgaper, a Wellco-Ro-Search affiliate, manufactures several different types of footwear made by various Wellco-Ro-Search processes. The Israeli company is believed to be the world's only shoe manufacturing firm owned by a trade union.

Southern Californians Tour

A group of Southern California industrialists, bankers, and civic leaders have conferred with government officials in Washington, D. C., and with financiers and businessmen in New York, N. Y., and Boston in an effort to attract industry to rapidly growing Southern California.

Arnold O. Beckman, president of Beckman Instruments, Inc., Fullerton, Calif., and president of the Los Angeles Chamber of Commerce, told a gathering of the press at the Sheraton-Astor Hotel, New York, N. Y., on September 17 that by 1975 the population of Southern California will have doubled to 14,500,000. New industries and businesses must grow accordingly, he added.

Speaking for the group, which calls itself the Southern California Industrial Development Tour, Dr. Beckman also revealed that several of its members are seeking building sites for offices and manufacturing facilities in New York and New England.

Coral Rubber Tire Tested

Military truck tires made entirely of Firestone Coral rubber have been successfully tested by U. S. Army Ordnance, it has been revealed by Harvey S. Firestone, Jr., chairman of The Firestone Tire & Rubber Co., Akron, O.

In making the announcement Mr. Firestone said that the tests prove that the development of a synthesized natural rubber can eliminate the need of stockpiling of natural rubber in the United States. Patent rights, research data, and experimental quantities of Coral rubber were said to have been offered to the Department of Defense and the rubber industry in general for advanced testing last year.

Technical experts in Army Ordnance tested size 14.00-20 heavy-duty truck tires on loaded military vehicles over rough terrain in summer heat at Camp Bullis, San Antonio, Tex. The performance met or exceeded all military requirements, Mr. Firestone declared.

To Build Nuclear Reactor

Ten large American corporations have joined to form a company that will build and operate a privately owned nuclear reactor for industrial research in atomic energy at Plainsboro, N. J. The new company has been registered as Industrial Reactor Laboratories, Inc.

The ten corporations are United States Rubber Co., Socony Mobil Oil Co., Radio Corp. of America, National Lead Co., Atlas Powder Co., American Machine & Foundry Co., Corning Glass Works, National Distillers Products Corp., Continental Can Co., and American Tobacco Co. All are headquartered in New York, N. Y., except Atlas Powder, which has headquarters in Wilmington, Del.

The new company's board of directors will be headed by Gen. Walter Bedell Smith, chairman and president of AMF Atomic, Inc., as president; and H. L. Hillyard, treasurer of American Tobacco Co., as treasurer.

O-Cel-O's "Plastifoamer"

O-Cel-O division of General Mills, Inc., Buffalo, N. Y., has entered the expanding polyurethane market by inaugurating the operation of a company-developed isocyanate and polyester resin mixer that is said to have a polyurethane production capacity of almost 10 million pounds a year.

Dubbed Plastifoamer, the machine is said to be capable of performing more than 100 individual mixing operations automatically, giving complete control over porosity, density, and color of the resulting polyurethane sponge, which the company has trade marked Plastifoam.

Largest Vacuum Deaerator Rubber-Lined by Manhattan

Police car escorts 52,000-gallon vacuum deaerator rubber-lined by Manhattan Rubber Division through the streets of Passaic-Clifton, N. J. A smaller completed unit brings up the rear.

A 52,000-gallon vacuum deaerator, called the largest ever fabricated, has been rubber lined by the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J., and transported by truck to the new generating station of the Public Service Electric & Gas Co., Linden, N. J.

The 74,000-pound tank, one of several rubber lined by Manhattan for the project, will be used in the country's largest ion exchange water processing system involving the removal of all minerals and silica. Makeup water for high-pressure boilers will be treated.

According to Manhattan, special vulcanizing methods were used in the bonding of the rubber to the steel interior of the huge tank. The finished lining was tested dielectrically for flaws.

General Tire Buys Byers

The General Tire & Rubber Co., Akron, O., has acquired about 75% of the common stock and 40% of the preferred stock of A. M. Byers Co., Pittsburgh, Pa., the only producer of wrought iron pipe in the United States and a manufacturer of electric furnace quality steel.

According to a General Tire plan, Byers will begin producing plastic pipe, aiming at an eventual $10,000,000 annual sales volume. The achievement of this goal will make Byers the largest producer and seller of plastic pipe in the world. The company has a plant in Pittsburgh and another in Ambridge, Pa.

U. S. Rubber TV Sponsor

Cosponsorship of eight college football games over a National Broadcasting Co. nationwide television network of 176 stations has been announced by United States Rubber Co., New York, N. Y., beginning September 22.

Five additional regional games, as well as two Thanksgiving Day contests, will also be cosponsored, C. H. Gilbert, director of advertising for U. S. Rubber, revealed.

Among the products to be advertised during the games are U. S. Royal Master tires, Koylon foam rubber mattresses and cushioning, U. S. Royal golf balls, Naugahyde coated fabrics, electrical wire and cable products, PowerGrip timing belts, hose, and conveyor belts.

Increasing Unitane Output

New production facilities at its Savannah, Ga., titanium dioxide pigment plant are being installed by American Cyanamid Co., New York, N. Y. The installations will be completed by early 1958 and will boost plant output to 72,000 tons annually.

Trade marked Unitane, the white pigment is being used in the manufacture of such products as white-wall tires, paints, enameled kitchen appliances, paper, and decorative finishes for cans and tubes.

Cyanamid also makes the pigment at its Piney River, Va., plant.

Preventing Hose "Wicking"

Four ways of preventing the "wicking" of rubber hose have been suggested by engineers of Thermoid Co., Trenton, N. J. "Wicking" is defined as the rising by capillary action of organic fluids up the reinforcing fibers of rubber hose when the unprotected end of a hose is placed into a liquid, such as gasoline. The weakening of the fibers will shorten the effective life of the hose.

The simplest way to overcome "wicking" is to couple a length of metal pipe into the end of the hose, according to the Thermoid engineers. Other suggested methods include the use of a standard metal end protector which will seal the end against contact with the liquid; the use of a liquid neoprene rubber compound which dries in a durable film over the end of the hose; and, for water applications, the dipping of the end of the hose into shellac.

Pliovic in Mold Hot-Melts

A vinyl hot-melt compound for the production of reproductive molds is being marketed by Calresin Corp., Los Angeles, Calif., according to the chemical division of The Goodyear Tire & Rubber Co., Akron, O., whose Pliovic vinyl resin is being used in the compound.

Called Plastiflex, the hot-melt material is composed primarily of vinyl resin and plasticizer and is supplied in granular form. Pliovic is said to accept a wide range of plasticizers to form a smooth, nonporous compound with high heat stability, good color characteristics, and adequate surface hardness.

The hot-melts are reported to be less expensive than such other mold materials as metal. The plastic molds can be remelted after use, and the compound employed again to cast other molds.

Tests Okay Firestone Rubber-Nylon Collapsible Tanks

In a southwestern oil field a Firestone Tire & Rubber Co. technician measures six-foot height of one of three 15,000-gallon-capacity rubberized nylon collapsible tanks being tested under actual operating conditions. The tanks are designed to hold oil, water, or other liquids in areas where storage or transportation problems occur, such as recently developed oil fields. Made by Firestone at its Magnolia, Ark., plant, these tanks are 45 feet long and 11 feet wide and, when not filled, can be rolled up into a package eight feet long and 2½ feet in diameter. The tanks have a built-in pressure-release system that prevents rupturing from overfilling

Isotope Products to Offer Industrial Radiation Service

A radiation service for industry will soon be inaugurated by Isotope Products, Inc., Buffalo, N. Y., which recently ordered a 15,500-curie cobalt source from Atomic Energy of Canada for a contemplated irradiation pilot plant.

In making the announcement, Louis Voyvodic, director of Nuclear projects for Isotope Products, said the company's radiation service will provide professional consultation and technical assistance to industry on all radiation applications. The program will also lead to the design and construction of individual commercial units for production-line irradiation techniques.

The irradiation pilot plant will be completed in 1957 at a cost of about $100,000. The radioactive source, cobalt 60, will provide up to 1,000,000 roentgens per hour of irradiation to a wide range of products of different sizes. Products will be exposed on a conveyor-belt system.

Recent research has shown that gamma and other types of radiation improve certain physical properties of rubber and plastics, accelerate chemical reactions, and cause the cracking of oils. Other practical uses of radiation include the sterilization of drugs and medical supplies, the treatment and conditioning of sewage soils, and the prolongation of the keeping qualities of perishable foods.

Isotope Products' radiation service will also plan experimental irradiation programs, maintain contact with groups working on parallel problems, and survey the results of past radiation research.

Traffic-Logged Philadelphia Gets Car Conveyor Plan

The construction of a series of passenger car-carrying conveyor belts through downtown Philadelphia to alleviate traffic congestion has been proposed by the Philadelphia Chamber of Commerce to business and civic leaders of Pennsylvania's most populous city.

Dubbed Carveyor, the system was developed by The Goodyear Tire & Rubber Co., Akron, O., and Stephens-Adamson Mfg. Co., Aurora, Ill. It was originally designed to replace the Grand Central-Times Square subway shuttle of the New York City Transit Authority, which subsequently vetoed the idea after plans for its construction were under way.

The Philadelphia conveyor would operate through an arcade-like structure over the sidewalk from a series of stations located in the second floors of stores, hotels, and office buildings. It would cost $13,500,000 or $16,000,000 for an alternate and longer route.

A 15-foot working model of the Carveyor was displayed at Philadelphia's Benjamin Franklin Hotel and at John Wanamaker's department store. The conveyor would be routed between New Independence Mall and 18th St. by way of Pennsylvania Blvd., Market, or Chestnut streets.

Full-scale sections of a similar passenger-type belt system have been experimentally operated for several years by Goodyear and Stephens-Adamson.

Hercules in Mexican Firm

Representing its first manufacturing venture in Latin America, Hercules Powder Co., Wilmington, Del., has acquired stock in Corbu Industrial, S.A., Mexico City, Mexico, producer of wood naval stores products.

Hercules is said to be the world's largest producer of wood naval stores. Its two plants at Brunswick, Ga., and Hattiesburg, Miss., have been producing chemicals from pine stumps for more than 30 years.

Corbu will build a new plant near Ciudad Hidalgo, in the State of Michoacan, and will manufacture 25 million pounds of wood naval stores products a year. Rosin, turpentine, pine oil, and other terpene chemicals will be made at the new plant from pine stumps on thousands of acres of cut-over woodland in the vicinity.

Parker O-Ring Compounds

Two new synthetic rubber materials to meet the requirements of military specification MIL-G-18586 have been developed by the research and development laboratory of Parker Appliance Co., Cleveland, O., under the direction of E. L. Carlotta, the company reveals.

Called Parker O-ring compounds 37-076 and 590-5, they will be used for molding seals needed in electrical switch boxes and other electrical closures aboard naval vessels, and for other general static seal applications not exposed to temperature extremes. The materials are said to be serviceable to — 20° F.

Chicago Molded Licenses

Chicago Molded Products Corp., Chicago, Ill., has licensed Pirelli S.p.A., Milan, Italy, to manufacture Campco-type thermoplastic sheet. The Italian firm is one of the major European producers of tires, rubber goods, and plastic products.

According to John J. Bachner, Chicago Molded's executive vice president, the agreement includes an interchange of technical information on sheet extrusion methods, processes, and machinery, as well as the training in this country of Italian representatives in Campco manufacturing methods. Campco is a division of Chicago Molded.

Campco-type thermoplastic sheet is a rubber-modified styrene sheet in use by the appliance industry because of its easy formability on molds, its impact and moisture resistance, and its porcelain-like finish. It has also found application in the display and toy industries.

To Use Huber Techniques

The manufacturing techniques of J. M. Huber Corp., New York, N. Y., will be incorporated into the design of a new carbon black plant being constructed by its joint owners, United Carbon Co., Inc., and Shell Petroleum Co., near Melbourne, Australia.

In making the announcement, Robert B. Takewell, Huber executive vice president, said the plant will produce standard grades of carbon black, matching the corresponding American types. Huber will participate in the distribution of the blacks in Australia. The company's current sales there are being handled by Arthur H. Pearce Co. and R. A. Christian Co.

New B-L-H Plant Opens

The electronics and instrumentation division of Baldwin-Lima-Hamilton Corp., Waltham, Mass., has begun operations at its new 100,000-square-foot plant in Waltham. The plant will manufacture SR-4 transducers and related instrumentation, as well as the Baldwin line of test machines, accessories, and grips.

Operations at the new plant combine those formerly conducted by O. S. Peters Co., Washington, D. C., Sonntag Scientific Co., Greenwich, Conn., and the SR-4 manufacturing of Ruge de Forest, Cambridge, Mass. The three companies are now part of the B-L-H organization.

Stock Options to Workers

Three-year options on 400,000 shares of its common stock have been granted to its employes by Monsanto Chemical Co., St. Louis, Mo. This is the first stock option plan for all its personnel offered by the company, although employes have had a time-payment stock purchase plan available for more than 20 years.

Price of the stock for the three-year period was set at $38.50, which was equal to 95% of the average between the high and low of the stock on the New York Stock Exchange on September 7, the day the plan was announced. Individual options are based on 30% of the employe's current annual income.

Studebaker-Packard Plans

A program designed to put the operations of Studebaker-Packard Corp., South Bend, Ind., into a profit-making position without increasing the company's present share of the automobile market was revealed by Harold E. Churchill, president, during a press conference at the Sheraton-Astor Hotel, New York, N. Y., September 5.

The program involves the reduction of operating costs, the institution of a market development plan, and a product development program which will stress the price areas of the auto market in which the company's products are strongest. The two consolidated automobile producers were recently acquired by Curtiss-Wright Corp.

Talalay Gives Foam Patent To Israel without Royalty

Joseph A. Talalay has assigned his foam rubber patent rights in Israel to the Technion-Israel Institute of Technology, Haifa, Israel, waiving all royalties and receiving a token payment of one dollar. The Talalay process is one of the two major foam rubber manufacturing techniques in use today.

The Russian-born scientist said he hoped his action would bring about the development of an important foam rubber industry in Israel. Technion is expected to use the waived royalties to strengthen science and technology in the small Near East nation.

The oldest institution of higher learning in Israel, Technion has a student enrollment of 3,000 and was once described by Karl K. Compton, then president of the Massachusetts Institute of Technology, as "the MIT of the Middle East."

The initiative for the assignment of Mr. Talalay's patent rights to Israel came through the American Society for Technion, which is seeking to encourage American inventors to assign their Israel patent rights to Technion in order to stimulate the industrial development of the new state.

Mr. Talalay, now a United States citizen, left Russia in 1920. He worked as a research consultant and rubber engineer in Latvia, Germany, and England before coming to this country in 1940.

Goodyear Tread Factory

A plant devoted exclusively to the production of tread rubber is being built by The Goodyear Tire & Rubber Co., Akron, O., at Chehalis, Wash. Completion of the million-dollar facility is expected by October, 1957. The structure will be a one-story, steel-framed, cement block and glass building with 22,000 square feet of floor space, including 5,000 square feet of storage space.

Robert W. Jenkinson has been named plant manager. He has been associated with the company for 25 years.

Drogin on Far East Industry

I. Drogin, vice president, United Carbon Co., who has been in the Far East since July, has forwarded some interesting comments and news notes regarding the rubber industry and its technology, from Australia and Indonesia.

United Carbon and Shell Chemical (Australia) Proprietary, Ltd., are building the first petrochemical unit in Australia at a cost of $6 million. This plant will produce carbon blacks primarily for the Australian rubber industry. In this connection, it was announced in a Melbourne newspaper in late August that Godfrey L. Cabot, Inc., had taken an option on a 40-acre site on the outskirts of Melbourne with a view to establishing a carbon black plant also.

In July, the announcement was made by A. C. Pullen, Shell Chemical (Australia), that Australia might enter the field of synthetic rubber production before many years. It was pointed out that the two basic ingredients are now available in that country from its own petroleum refineries.

Dr. Drogin reported great interest in American rubber industry practices and techniques. He addressed the Sydney and Melbourne sections of the Institution of the Rubber Industry while in Australia.

In Indonesia, Dr. Drogin visited the Indonesian Rubber Research Institute and discussed rubber technology with its director, D. G. J. van der Bie, and his assistants. The latest in modern mixing and processing equipment is being installed at the Institute, which is actively working on means of improving the dispersion of carbon black in natural rubber, with special reference to latex masterbatches.

Increasing TiO_2 Production

Plans to increase production of titanium dioxide at its recently acquired Gloucester City, N. J., plant, have been revealed by New Jersey Zinc Co., New York, N. Y.

Several phases of the operation are to be altered for greater efficiency and boosted output. The company's overall plan of expansion calls for the eventual construction of a new plant. Researchers are also working to determine the pigment grades best suited to specific industrial applications and to develop new and improved grades.

BFG Canada Lining Tanks

A tank-lining contract calling for more than 10 acres of rubber to complete the task has been awarded to B. F. Goodrich Canada, Ltd., Kitchener, Ont., it has been revealed by H. P. Hawkins, general manager of the company's industrial products division.

The tanks are owned by Northspan Uranium Mines, Ltd., and will be used in the processing of uranium near Blind River, Ont. Three Goodrich linings will be applied to each of 147 major tanks and 80 smaller ones. Several miles of pipes and fittings will also be lined.

Tanks, ranging in size from six to 50 feet in depth and from six to 110 feet in diameter, will be lined in the Blind River district. The smaller units will be lined at Goodrich's Kitchener plant. The project is scheduled for completion by July, 1957.

Wooster (Canada) Plant

Wooster Rubber Co. (Canada), Ltd., began production at its new Cookesville, Ont., houseware and automotive products plant on October 1. A subsidiary of The Wooster Rubber Co., Wooster, O., the company's previous operations were at leased quarters at Port Credit, Ont.

Douglas G. Sinclair has been appointed sales manager of the Canadian firm. The new plant is producing Wooster's full line of molded and dipped goods sold under the trade name, Rubbermaid.

New Navy Specs Deal with Mounts and Hose Fittings

A revised military specification on resilient mounts and a new military specification on water and steam hose fittings have been issued by the Department of the Navy, Bureau of Ships, Washington, D. C.

Military Specification MIL-M-17185A (Ships) of August 27, 1956, covers the general design and performance requirements, as well as specific tests for determining the suitability and performance characteristics, of resilient mounts for use on naval vessels. Issued to promote the development and production of new mounts for shipboard use, it is not restrictive as to the construction details of mounts. It replaces the original specification of May 12, 1952.

Military Specification MIL-F-19488 (Ships) of July 27, 1956, is a new specification covering fittings for various hoses used on naval vessels. Delineated are nozzles, strainers, reducing couplings and couplings for rubber steam, water-suction, and wash deck hose and cotton rubber-lined fire hose. Some of these fittings were originally described in the old Navy Department Specification 34-F-3, now cancelled, and others were covered in individual hose specifications.

Polymer Gives Scholarships

Scholarship awards of $4,000 each have been won by a son and a daughter of two employes of Polymer Corp., Ltd., Sarnia, Ont., Canada. The scholarships were established this year by the company. Eligible are the sons, daughters, or legal wards of Polymer employes with a minimum of one year of service.

June Alberta Pollard and William George Muir, the successful candidates, will be permitted to choose a course of study at one of 14 Canadian universities selected by the company. Scholarship award plans for 1957 are currently being considered.

Newman G-E Section Head

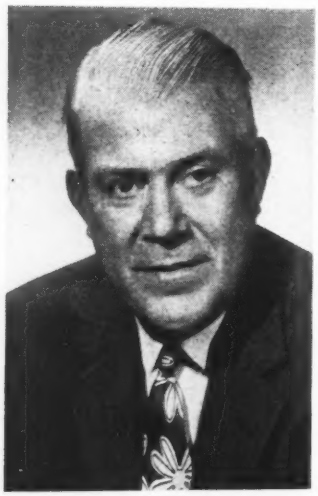
The manufacture and sale of General Electric Co.'s principal lines of electrical insulating materials have been grouped within a single organizational component, according to R. L. Gibson, company vice president and general manager of its chemical and metallurgical division, Pittsfield, Mass.

The special insulating materials section will be headed by Louis E. Newman and will headquarter in Schenectady, N. Y., at manufacturing facilities formerly attached to G-E's laminated and insulating products department.

Mr. Newman joined General Electric in 1929 as a test engineer. In 1935 he was given the company's Charles A. Coffin Award for developing special methods for calculating the performance of automatic extraction steam turbines. He is author of the text, "Modern Turbines," and of many articles in the trade press.

News About People

Tom W. Macy, Jr.



Randall D. Smith

Randall D. Smith has been appointed vice president in charge of manufacturing and development engineering for Firestone Industrial Products Co., division of The Firestone Tire & Rubber Co., Akron, O. He was previously plant manager of the division's Noblesville, Ind., plant.

Herman Schneiderman has joined American Latex Products Corp., Hawthorne, Calif., as technical director. Dr. Schneiderman is widely experienced in chemical engineering applications, atomic energy radiation of polymers, rocket fuels, and fiber-glass plastic structures for the missile industry.

Tom W. Macy, Jr., has joined Emery Industries, Inc., Cincinnati, O., as sales representative to the New England territory for the fatty acid sales department.

H. D. Tompkins, vice president, The Firestone Tire & Rubber Co., Akron, O., has been elected chairman of the Inter-Industry Highway Safety Committee, Washington, D. C., succeeding **A. vanderZee,** Chrysler Corp., who had served for two years. Among the other Committee members are: **Howard N. Hawkes,** vice president, United States Rubber Co.; **J. A. Hoban,** vice president, marketing, The B. F. Goodrich Co.; **Victor Holt, Jr.,** vice president, Goodyear Tire & Rubber Co.; **L. A. McQueen,** vice president in charge of sales, The General Tire & Rubber Co.

George F. Polzer has joined Witco Chemical Co., New York, N. Y., as purchasing director. A chemical engineer with a background in production and research, he was formerly general purchasing agent for chemical raw materials with American Cyanamid Co.

V. E. Wellman has been named manager of the petrochemicals department of the organic chemicals division of American Cyanamid Co., New York, N. Y.; while **R. W. Daniels** has been appointed manager of the intermediates department, and **P. G. Connell, Jr.,** manager of the rubber chemicals department. Dr. Wellman, who first joined American Cyanamid in 1945, was formerly manager of all three departments. Mr. Daniels became associated with the company in 1936; Mr. Connell, in 1946.

R. W. Daniels

Vincent Griffin has been reassigned as factory manager of a new Peruvian tire and rubber plant in which the B. F. Goodrich Co., Akron, O., has an interest. Also reassigned to the plant were Goodrich's **William Harrison Bice,** who will be technical advisor on tire construction, and **Robert J. Young,** who will be technical advisor on tire compounding.

Howard W. Harding, vice president and sales manager of Avon Sole Co., Avon, Mass., has been elected treasurer of the firm. Elected members of the board were **Sydney R. Miller,** director of research, and **Walter A. Forbush, Jr.,** purchasing agent and cost accountant.

P. F. Derr and **Raymond Annino** have been named supervisors of process research and analytical research, respectively, in the laboratory section, research and development department, of Food Machinery & Chemical Corp.'s Westvaco Chlor-Alkali Division, South Charleston, W. Va. **G. S. Haines** becomes technical staff assistant to the department's laboratory section director.

V. E. Wellman

P. G. Connell, Jr.

L. Lawrence Forward

N. Dudley Steele

N. Dudley Steele has been advanced to general production superintendent of carbon black for the southwestern division of Cabot Carbon Co., Boston, Mass.

W. H. Jefferson has joined the sales staff of General Latex & Chemical Corp., Cambridge, Mass., as sales supervisor in the Ashland, O., area. **Lawrence F. Haemer** has been named sales representative to the New Jersey, Pennsylvania, Delaware, and Maryland territories. **J. E. Gingrich** has been appointed sales representative to the South Carolina, North Carolina, and Virginia territories for General Latex & Chemical Corp. of Georgia. **William J. Watson** has been named sales representative in the Ashland area for general Latex & Chemical Corp. of Ohio, as has **T. G. Tierney. W. W. Seward** has been appointed general manager of General Latex of Georgia.

Charles H. Kanavel has been appointed field sales manager for B. F. Goodrich Aviation Products, division of The B. F. Goodrich Co., Akron, O. He was formerly western zone manager, aeronautical sales.

Frank S. Ward has been appointed administrative assistant to the president of Taylor Instrument Cos., Rochester, N. Y., and has been succeeded as general sales manager by **L. Lawrence Forward. Albert J. Fleig** has been named assistant to Mr. Forward and has been succeeded as industrial sales manager by **George Heller,** formerly assistant industrial sales manager.

Benjamin R. Wendrow, chief development chemist for U. S. Rubber Reclaiming Co., Inc., Buffalo, N. Y., has been advanced to technical manager.

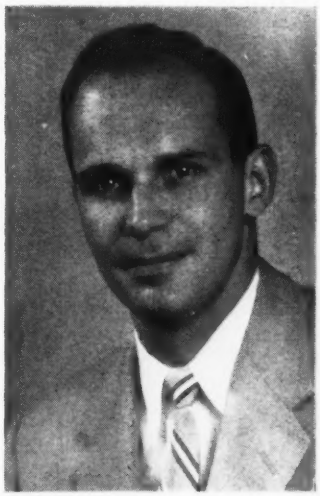
C. Herman Behrle, assistant manager of passenger tire sales for B. F. Goodrich Tire Co., division of The B. F. Goodrich Co., Akron, O., has been promoted to manager of passenger tire sales.

G. G. Zimmerman, eastern zone manager of aeronautical sales for B. F. Goodrich Aviation Products, Akron, O., has been named manager of tires, airlines, and distributors.

A. D. Marr has been appointed chemist and manager of product development for Judsen Rubber Works, Inc., Chicago, Ill. He was formerly associated with Dryden Rubber Co.

Henry C. Heine and **Dale L. Walker** have been advanced to industrial products merchandise manager and manager of distributor sales, respectively, for Hewitt-Robins, Inc., Stamford, Conn.

William P. Hemp has been promoted to assistant sales manager of tape products for the International division of Minnesota Mining & Mfg. Co., St. Paul, Minn.



Schalk Studios

James J. McCarthy

James J. McCarthy recently joined the technical sales force of U. S. Rubber Reclaiming Co., Inc., Buffalo, N. Y., to cover the central and southern states. He formerly worked in the synthetic and compounding divisions of The Firestone Tire & Rubber Co.

Benjamin R. Wendrow

Maurice G. Stuffmann

Maurice G. Stuffmann has joined the Los Angeles district sales staff of Pennsylvania Industrial Chemical Corp., Clairton, Pa. He has been on Picco's technical staff since 1948.

Edwin J. Lewis and **William H. Campbell** have been advanced to manager of merchandising and manager of tire sales, respectively, for replacement tire sales in B. F. Goodrich Tire Co., Akron, O. **Harry N. Roberts** has been named manager of dealer sales.

Bentley G. McCloud, Jr., vice president of the First National Bank of Chicago, has been elected to the board of directors of The Dayton Rubber Co., Akron, O., succeeding his father, **Bentley McCloud, Sr.,** who died recently.

Kenneth J. Campbell has been advanced to the position of administrator of general services of the dyestuff and chemical division of General Aniline & Film Corp., New York, N. Y. He will direct the activities of the credit, traffic, advertising, pricing and sample departments.

Charles L. Fleming, Jr., has been elected a vice president and director of Esso Research & Engineering Co., New York, N. Y., succeeding **Carl O. Tongberg,** who has resigned to become a vice president and director of Carter Oil Co. Replacing Dr. Fleming as deputy coordinator for petroleum products and medical research is **John G. McNab,** who has been succeeded as director of the products research division by **Miller W. Swaney,** formerly director of the Enjay Laboratories. **Elfried F. H. Pennekamp,** assistant director of the Laboratories, assumes Dr. Swaney's former duties. **Harold J. Rose** has been appointed coordinator of chemicals research.

L. R. Graham, G. O. Fishburn, R. C. Muller, H. M. Jones, Jr., and **J. W. Demaree** have joined the sales staff of Carbide & Carbon Chemicals Co., New York, N. Y. Also added to the sales staff were **E. P. Cass, H. R. Hubbs, T. J. Kuzara, N. J. Hill, A. M. Chagares, A. V. D'Amelia, G. W. Shoemaker, W. C. Friedmann,** and **A. G. Breckling.**

Edmund G. Nagle has been appointed manager of automotive sales for the footwear and general products division of United States Rubber Co., New York, N. Y. He will headquarter in Detroit, Mich.

Frank Hager has been advanced to assistant manager of the Akron sales district for Seiberling Rubber Co., Akron, O. He has been associated with the company for ten years.

W. W. Thies has been advanced to manager of the tire production planning department of The Firestone Tire & Rubber Co., Akron, O. He was formerly an industrial engineer in the company's general engineering department.

Frank A. Mather has been assigned to the Philadelphia district as special representative for the chemical division of The Goodyear Tire & Rubber Co., Akron, O.

Frank A. Mather

Charles L. Fleming, Jr.

Miller W. Swaney

Elfried F. H. Pennekamp

Albert L. Lefler has joined the organic chemical sales department of Emery Industries, Inc., Cincinnati, O.

C. Howard Adams has been appointed manager of plastic product development for the general development department of the research and engineering division of Monsanto Chemical Co., St. Louis, Mo. Formerly research group leader and research technical service supervisor for the company's plastics division, Mr. Adams has been associated with Monsanto since 1945.

David J. Rex has been advanced to process engineer for the silicate, detergent, calcium division of Diamond Alkali Co., Cleveland, O.

William C. Wiley has been named to head coordination of marketing activities for the Polyco-Monomer department of the chemical division of Borden Co., New York, N. Y. He was transferred from the division's central research laboratory in Philadelphia.

F. E. Pringle has joined Howe Scale Co., Rutland, Vt., as assistant general sales manager for the industrial scales and materials handling equipment firm.

David M. French has joined the research and engineering division of Wyandotte Chemicals Corp., Wyandotte, Mich., and will be engaged in polymer research.

Earl R. Lewis, Jr., has been named production manager of the cutting tool and gage divisions of Pratt & Whitney Co., Inc., West Hartford, Conn.

E. B. Burnley has been appointed sales manager for the materials handling receptacles line of National Vulcanized Fibre Co., Wilmington, Del. He will continue as staff assistant to the company's general sales manager, Roy S. Fisher.

Donn Snyder has joined the carbon black and pigment division of Columbian Carbon Co., New York, N. Y. He will headquarter in Boston, Mass.

Donn Snyder

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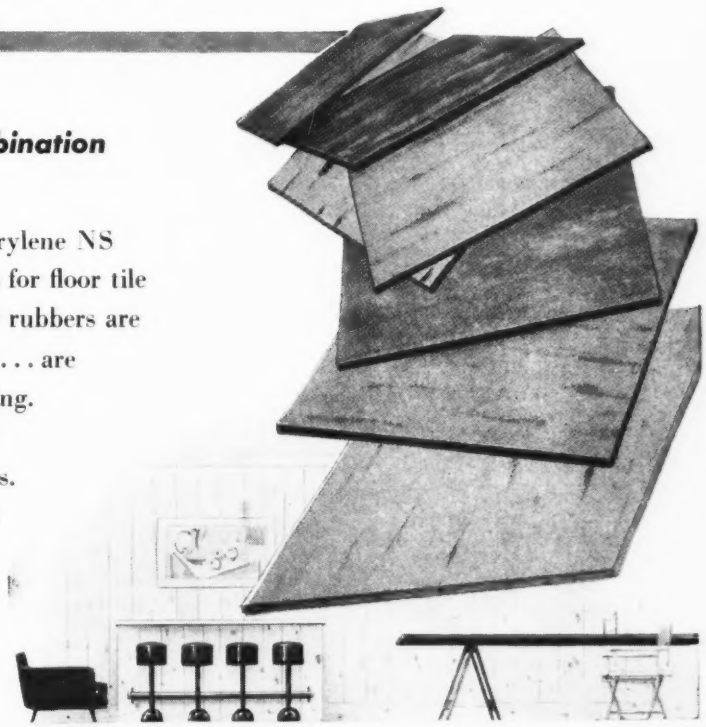
Polysar SS-250 and Polysar Krylene NS together provide the ideal basis for floor tile compounds. These two Polysar rubbers are the whitest Polymers available . . . are non-staining and non-discolouring. They permit easy dispersion of pigment and short mixing cycles. Polysar rubbers have improved floor tile—they can improve your products, too.



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John F. Daley has been elected a director, vice president, and member of the executive committee of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Succeeding him as general manager of the company's organic chemicals department is **Samuel G. Baker,** whose duties as general manager of Du Pont's photo products department have been assumed by **John M. Clark,** formerly assistant general manager of that department.

John J. Healy, Jr., has been appointed director of general development for the research and engineering division of Monsanto Chemical Co., St. Louis, Mo., succeeding **Hal G. Johnson,** who will shortly be given a leave of absence to undertake a government assignment in Washington. Mr. Healy had been assistant to Monsanto's vice president for research, development, and engineering.

Roland H. Guinzburg, executive vice president of I. B. Kleinert Rubber Co., New York, N. Y., has been elected a member of the board of directors and a vice president of College Point National Bank, Long Island, N. Y.

R. E. Wilkins and **W. A. Terrall, Jr.,** have been advanced to managers of the sales research and sales forecasting sections, respectively, of the marketing research department of The Firestone Tire & Rubber Co., Akron, O.

Roy W. Keeley has been named vice president and general sales manager of the international division of Minnesota Mining & Mfg. Co., St. Paul, Minn. He was formerly director of sales for Minnesota Mining & Mfg. of Canada, Ltd.

J. D. Barrington, president of Polymer Corp., Ltd., Sarnia, Ont., Canada, served as one of three discussion group chairmen at Canada's National Engineering Manpower Conference, held September 9-11 at St. Andrews-by-the-Sea, N. B.

D. E. Henderson has assumed the duties of president and general manager of Associated Rubber, Inc., Quakertown, Pa.; while **A. N. Shea** has become chairman of the board and vice president in charge of sales.

Lee R. Jackson, president, The Firestone Tire & Rubber Co., Akron, O., has been cited by the Michigan Trucking Association for his contributions to the American trucking industry.

W. Russell Bone has joined Ball Bros. Co., Inc., Muncie, Ind., as assistant to the executive vice president.

Louis Citarel has been named Thiokol Fellow in Chemistry at the Polytechnic Institute of Brooklyn for the 1956-57 academic year, the second annual fellowship awarded to Polytechnic by Thiokol Chemical Corp., Trenton, N. J.

Donald E. Jones

Donald E. Jones has joined U. S. Rubber Reclaiming Co., Buffalo, N. Y., as sales representative to the New York, New Jersey, and New England areas.

W. H. Bartlett, vice president in charge of manufacturing for Dunlop Canada, Ltd., Toronto, Ont., has retired and been succeeded by **K. Byard,** of Dunlop Overseas.

Norman O. V. Sonntag has joined the research staff of Emery Industries, Inc., Cincinnati, O., and has been assigned to the process research section, where he will be in charge of jet and gas turbine engine synthetic lubricant research.

Walter S. Beanblossom, a supervisor of applied organic research in the research and development department of Hooker Electrochemical Co., Niagara Falls, N. Y., has been appointed administrative assistant to management.

George H. Hand has joined Stauffer Chemical Co., Los Angeles, Calif., as an industrial engineer with the company's molded products division.

L. J. Keyes has been named director of purchases for The Dayton Rubber Co., Dayton, O., succeeding **C. D. Bucher,** who has resigned to enter business for himself.

Mrs. Bertha Chance has joined Emery Industries, Inc., Cincinnati, O., as research librarian.

Cameron J. Duff has joined the Chicago sales office of Witco Chemical Co., New York, N. Y., where he will handle the company's chemical division line.

News Briefs

General Electric Co., Schenectady, N. Y., is conducting gamma radiation research on rubbers and plastics at the Atomic Energy Commission's Hanford, Wash., plant. Aim of the investigation is to develop better materials for reactor construction.

A. Schulman, Inc., Akron, O., has been named a sales agent for The Goodyear Tire & Rubber Co.'s Plioflex synthetic rubber.

Monsanto Canada, Ltd., Montreal, P. Q., has begun operations at its recently completed phenolic and urea resin plant at Clover Bar, Alta.

M. J. Voit Rubber Corp., Los Angeles, Calif., has added four new sizes to its line of molded flexible radiator hose: 1½- by 9-inch for Chevrolet truck upper and other passenger-car uses; 1½- by 5¾-inch for Chevrolet six-cylinder 1955-56 upper; 2- by 12-inch for Ford, Mercury, Lincoln, and Pontiac 1955-56 lower; and 1½- by 15½-inch for Buick 1954-55-56 lower.

Columbian Carbon Co., New York, N. Y., is distributing free a 16-mm. 31-minute motion picture in color called "Readin'-'Ritin'-Ridin' with Carbon." Inquiries should be directed to the public relations department.

United States Rubber Co., textile division, New York, N. Y., has licensed Collins & Aikman Corp. to produce fabrics through its patented technique incorporating contractible strands to achieve three-dimensional effects. Trilok is U. S. Rubber's name for these fabrics.

National Aniline Division, Allied Chemical & Dye Corp., New York, N. Y., has opened a branch office at 326 S. Main St., Akron, O., under the direction of R. W. Vail.

Wellco Shoe Corp., Waynesville, N. C., has given one share each of its preferred stock to 102 employes who have served 10 or more years. The stock has a par value of $100 and earns a cumulative dividend of 5% a year.

for less than 2¢ per tire

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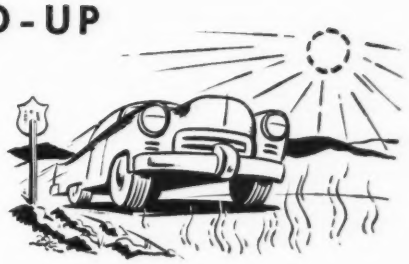
Helps Prevent HEAT BUILD-UP

Increased speeds have intensified the problem of heat build-up caused by flexure. By using Circosol-2XH® you get a more resilient rubber. This higher resiliency reduces hysteresis...lessens heat build-up...gives longer tire life.



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Squeal is a tread-design as well as a tread-compounding problem. The controlled balance of naphthenic and aromatic hydrocarbons in Sun's Circosol-2XH may answer your compounding problem...and...do it without sacrificing abrasion resistance or toughness.

Helps Make TIRES TOUGHER, SAFER

Circosol-2XH will give you tougher, more resilient rubber needed to make safer tires. Tests show that tires made with Circosol-2XH can take more impacts and a rougher all around beating than tires made with softeners of different composition.

And... CIRCOSOL-2XH IS ECONOMICAL

The cost of these extra advantages is low. Enough Circosol-2XH for an 8.00 x 15 size, 100 level tire costs less than 2¢ more than the cheapest softener you can buy. Get the full story on both the advantages and the low price of Circosol-2XH from your Sun representative. Or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. RW-10.

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Wabash Rubber & Plastics Corp. has begun the production of plastic items for the appliance and automotive industries at its recently completed plant in Seymour, Ind. The one-story building has 15,000 square feet of floor space. Wabash Rubber & Plastics is a subsidiary of H. O. Canfield Co., Bridgeport, Conn., rubber products and components manufacturer since 1888.

Automatic Switch Co. has moved its Pacific Coast factory branch to larger quarters at 1233 Goodrich Blvd., Los Angeles, Calif.

Parker Appliance Co., Cleveland, O., has appointed Air-Draulics Co., Phoenix, Ariz., distributor in the Arizona area of its synthetic rubber O-ring seals.

Pantasote Co., Passaic, N. J., manufacturer of vinyl films and vinyl-coated fabrics, has moved its New York, N. Y., offices to 415 Madison Ave.

United Shoe Plastics, Ltd., Midland, Ont., Canada, has been formed jointly by Monsanto Canada, Ltd., and Shoe Corp. of America, for the manufacture of plastic components for the footwear industry.

Brown Rubber Co., Lafayette, Ind., is making foamed vinyl for fabrication into elementary-school desk-seats upholstery. The material is based on Goodrich's Geon 121 paste resin. An embossed vinyl surface is integrated with the foam during the manufacturing process.

Clevite Harris Products, Inc., Cleveland, O., producer of specially engineered rubber and rubber-and-metal parts, has named I. J. Carroll and James E. Bushong special products division representatives at the home office. Henry M. McCarthy has been appointed West Coast sales district manager in Los Angeles.

Financial

S. S. White Dental Mfg. Co., Philadelphia, Pa., and domestic and Canadian subsidiaries. January 1-June 30, 1956: net profit, $372,234, equal to $1.01 a capital share, against $312,987, or 85¢ a share, in the same months last year; sales, $11,090,976, against $10,610,768.

United Carbon Co., Charleston, W. Va., and subsidiaries. First six months, 1956: net profit, $3,018,106, equal to $2.53 a capital share, compared with $2,510,138, or $2.10 a share, in the preceding year's months; net sales, $31,600,211, against $19,687,915.

United Elastic Corp., Easthampton, Mass. Half ended June 30, 1956: net profit, $958,394, equal to $2.36 a share, against $821,310, or $2.03 a share, in the 1955 period.

Union Asbestos & Rubber Co., Chicago, Ill. June half, 1956: net loss $254,818, compared with net loss of $2,256 in the like period last year; net sales, $6,889,600, against $7,044,861.

Thermoid Co., Trenton, N. J. Six months to June 30, 1956: net income, $898,943, equal to $1.02 a common share, against $703,204, or 81¢ a share, in last year's months; gross sales, $20,295,702, against $18,036,007.

Sheller Mfg. Corp., Portland, Ind. Half ended June 30, 1956: net income, $820,210, equal to 86¢ a share, contrasted with $1,925,876, or $2.02 a share, in the corresponding months of the previous year; net sales, $21,810,760, against $28,369,198.

Parker Appliance Co., Cleveland, O. Year ended June 30, 1956: net income, $521,425, equal to $1.35 a share, contrasted with $1,120,342, or $2.89 a share, in the preceding fiscal year.

Lee Rubber & Tire Corp., Conshohocken, Pa. Nine months to July 31, 1956: net profit, $1,162,375, equal to $1.37 a share, against $1,142,408, equal to $1.34 a share, a year earlier.

W. R. Grace & Co., New York, N. Y., and subsidiaries. First half, 1956: net income, $10,547,545, equal to $2.37 a common share, against $9,426,664, or $2.14 a share, in last year's half; net sales, $170,505,395, against $172,253,455.

Eagle-Picher Co., Cincinnati, O. Nine months to August 31, 1956: net profit, $5,049,400, equal to $5.01 a share, against $3,325,343, or $3.36 a share, in the 1955 months; net sales, $85,991,282, against $83,645,527.

Firestone Tire & Rubber Co., Akron, O., and subsidiaries. Nine months ended July 31, 1956: net earnings, $42,904,733, equal to $5.27 each on 8,101,486 common shares, compared with $37,584,918, or $4.62 each on 8,074,836 shares, a year earlier; net sales, $813,750,210, against $804,542,173.

Dayton Rubber Co., Dayton, O. Nine months ended July 31, 1956: net earnings, $1,630,179, equal to $2.21 a common share, against $1,475,566, or $2.17 a share, a year earlier; net sales, $54,172,336, against $48,023,231.

Aetna-Standard Engineering Co., Akron, O. Year ended June 30, 1956: net profit, $1,298,064, equal to $3.08 a share, compared with $1,037,790, or $2.58 a share, in the preceding fiscal year.

Gariock Packing Co., Palmyra, N. Y. June half, 1956: net earnings, $1,256,541, equal to $2.79 a share, compared with $676,084, or $1.61 a share, in 1955.

Obituaries

Wesley H. Esty

Wesley H. Esty, vice president and treasurer of Heveatex Corp., Melrose, Mass., died suddenly of a heart attack at Lebanon, N. H., August 19.

Born in St. John, N. B., Canada, 66 years ago, Mr. Esty moved to Melrose in 1915, where he lived until his death.

Before joining Heveatex in 1934, he was custodian of the Melrose and Malden, Mass., plants of the United States Rubber Co.

He was a member of the Lodge of Sterling and Middlesex Lodge, I.O.O.F., both of Malden, and of the Knights of Pythias in St. John.

He is survived by his wife, a daughter, and a grandson.

Louis C. Harvey

Louis C. Harvey, Philadelphia manager of American Mineral Spirits Co., Chicago, Ill., died September 15 at his home in Drexel Hill, Pa., following a heart attack. He was 55.

A graduate of the University of Pennsylvania, Mr. Harvey joined the company in 1939 and was shortly after appointed Philadelphia district manager.

He had been active in many trade associations in Philadelphia, serving as an officer and a director of several.

He is survived by his wife and a daughter.

High Requiem Mass was sung at St. Bernadettes Church on September 19.

Harry B. Polson

Harry B. Polson, founder and chairman of the board of The Polson Rubber Co., Garrettsville, O., died at his home in Shaker Heights, O., September 2, after a long illness.

After he and his brother sold their retail automotive supply store, Mr. Polson founded the company that bore his name in Kansas City, Mo., in 1909, to manufacture tire accessories and repair materials. An additional plant was built in Cleveland in 1917. Six years later, operations of the two plants were combined in new facilities at Garrettsville.

The deceased was born in Kentucky in 1875.

Mr. Polson is survived by his wife, a son, two grandchildren, and two sisters.

The ring of quality

Colorful, low-cost sidewall rings that can be quickly installed on tires are now contributing to the luxury-look of today's new cars. They're inexpensive, stay brilliant for life, wash bright in seconds, out-last tires. A product of The Bearfoot Sole Co., Wadsworth, Ohio, these rings are available in a variety of colors or in white. They're made of Enjay Butyl Rubber because no other rubber tested could equal its performance in severe laboratory and road tests. The Enjay Butyl label on the Flex-A-Wall ® carton assures the buyer of outstanding quality.

Find out for yourself the many technical advantages of Enjay Butyl—the rubber that is outperforming natural and other types of rubber in a wide variety of industrial and consumer applications. For full information, and for technical assistance in the use of Enjay Butyl, write, wire or phone the Enjay Company.

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News from Abroad

Malaya

Red China Export Ban Lifted; Renewed Trade Difficult

Early in June the ban on rubber exports to Red China was lifted, and many a rubber dealer in Singapore got ready to take orders for Malayan rubber to China. Now three months later, orders still have not come in. To be sure, it was realized that no very large amounts of rubber would be required from Malaya for the time being, since, at best, China probably did not now use more than about 100,000 tons a year and that she had commitments with Ceylon and probably with Russia, too, through whom her requirements were also thought to be partly covered.

But when a month had passed with no sign of interest in Malayan rubber from China, a group of Chinese and European business men from Singapore and the Federation, mainly rubber dealers, decided to form an unofficial trade mission to China to try to establish trade contacts personally. At the same time, Japan would also be visited. Accordingly a 15-man mission left in August for Japan; the mission was met in Hong Kong on the return from Japan, by 15 more delegates, and the entire group then proceeded to China.

Since then a number of messages have come from the delegation which have so far been more interesting in the suggestion they convey of a certain coyness on the part of China than in actual statements of fact and accomplishment. At the same time private hints from individual delegates seem to have been passed on, and these combined with the messages have had the effect of providing some flutters for the Singapore market.

The first news from Peking stated that China was not interested in immediate supplies of Malayan rubber, but might be in the market for small amounts in the first few months of 1957. In Singapore it was thought that China was holding off until after the discussions with Ceylon over the renewal of the rubber-rice pact for 1957, and dealers were not discouraged because they felt that trade with China is a long-term matter; they are focusing on China's probable future consumption which they believe will be huge. Before World War II that country used only about 10,000 tons of rubber a year; she appears to be using that much in a month now, which reflects a rapid expansion of transport and industry, they point out, and they foresee continued development at this assumed rate, with proportionate increase in rubber needs.

Next came the disturbing report that China preferred to deal through the Singapore Rubber Trade Association, representing local Chinese merchants, rather than through the internationally recognized Singapore Chamber of Commerce Rubber Association. This move has been construed as an attempt by Red China to introduce politics into rubber trading.

The SCCRA has world-accepted standards of grades and contracts, which dovetail with local contracts; it also has an internationally recognized panel of arbitrators for compensation, which the Chinese organization has not got. If the trade with China were carried on without the SCCRA, it would be deprived of its international pattern and would complicate business in Singapore and in world markets.

Singapore received another jolt from a message saying that China probably would not accept shipments of Malaya rubber unless payment could be made after delivery, a condition which even Russia had not made.

The latest reports from the delegation indicate that it has been possible to come to an agreement with the Chinese Ministry of Foreign Trade on a basis for rubber transactions.

Smallholder Replanting Lags

By the end of 1955, smallholders in the Malayan Federation had replanted only 52.6% of the target aimed at for the period 1953-1955, inclusive, the Chief Replanting Officer of the Rubber Industry (Replanting) Board revealed in his report for 1955, published in August, 1956. The total replanted area was slightly more than 79,000 acres, instead of 150,300 acres, the quota set for the three-year period. In addition, 6,000 acres were replanted that did not come under the scheme. Altogether rather more than $12,500,000 (Straits) had been paid out in grants so far. Of the total replanted area, 8,000 acres were planted to various crops other than rubber, including coconuts, fruit, coffee, etc.

The report is optimistic about 1956, expected to be a banner year for native replanting; the number of applications received during the year so far holds out the promise that at least 60% of the target of 70,000 acres for the year will be achieved. From the satisfaction with which the prospect of 60% of the quota is regarded, it is obvious that the authorities are ready to concede that the original quota for the scheme, that is, 500,000 acres to be replanted during 1953-1959, inclusive, is unrealistic and that at best not much more than 60% of this figure can in fact be expected. In 1952 when the scheme was developed, the total area of smallholder rubber was officially put at 1,616,093 acres, and at the time replanting 500,000 acres, that is, a little less than one-third of the whole, in seven years, seemed feasible, although even then the prediction had been made that not more than 50-60% would actually be achieved.

The amount of replanting done in the individual states in 1955 varied considerably, ranging from 166% of quota for Malacca down to 24% for Johore. Unfortunately, Malacca's quota was too small to have any marked effect on overall results, whereas Johore's was the largest, so that its poor showing was largely responsible for the low average for the Federation.

Rubber Roads

The fluctuations in the price of rubber are affecting road construction in Kuala Lumpur, it is learned. The Kuala Municipality had planned to lay eight miles of rubber road this year, including the 1½-mile approach to the local airport. But costs have risen and are now 10% above the amount originally estimated and budgeted for. Consequently work can proceed only as money becomes available.

Early in 1956 it was stated that programs for rubber road-surfacing had also been outlined for Selangor and Malacca; in the former instance 30 miles of such roads had been planned, and in the latter three miles. Whether these schemes have been affected by rubber prices, too, was not revealed.

East Germany

Leipzig Spring Fair

It was remarked at the Leipzig Spring Fair of 1956 that West Germany is showing increasing interest in these events, and that more manufacturers, also representing the rubber industry, displayed their goods there than on previous occasions. The exhibits by East German firms in the rubber section included, for the most part, mechanical goods, as fire hose, floor coverings, conveyor belting, gloves, footwear and protective garments for factory workers. Shoes for sports and camping, galoshes, raincoats, and a few toys were also seen. VEB Gummiwerk Elbe, Wittenberg, had the distinction of being the first firm in this sector to show colored latex thread for the elastic and knit goods trade; another first seems to have been the foam rubber upholstery for the automobile and furniture industries, made from natural and synthetic latices by VEB Elguwa Leipziger Gummiwarenfabriken. This firm also displayed sponge rubber sheet and molded cellular rubber goods.

Perlon fiber (nylon) and cloth were used by a few firms in the manufacture of fire hose and belting, and VEB Reifenwerk Riesa made the carcasses of its racing tires with Perlon cord. The three leading East German tire manufacturers were rather well represented by truck, bus, sports, and farm and tractor tires (including earth-mover type), many featuring new profiles. On the other hand, the Soviet Union and

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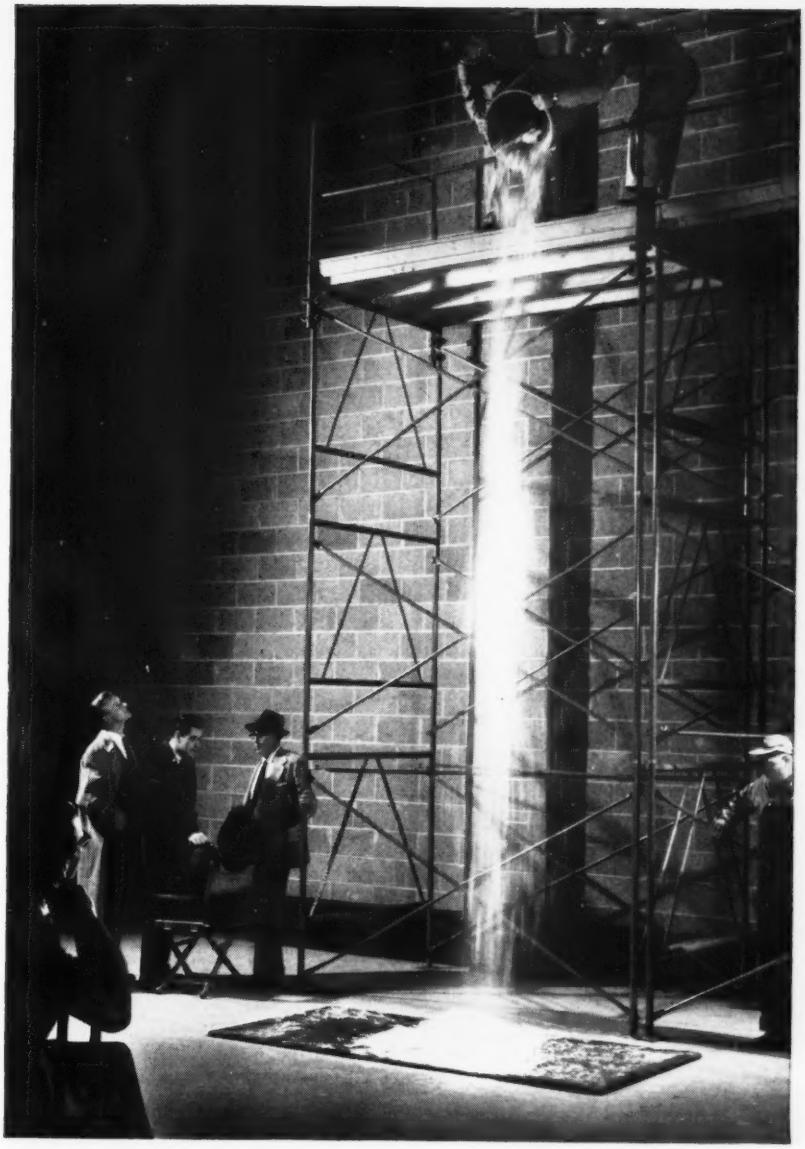

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This new dustless industrial salicylic acid offers three distinct advantages as a retarder in your vulcanization process—

1. Speed and convenience
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most of its satellite countries apparently did not care to show more than a small number of tires in a limited range of types.

Experiments are being conducted by two East German firms on tubeless tires. VEB Reifenwerk Furstenwalde/Spree, the largest tire manufacturer in East Germany, has succeeded in producing a tubeless tire for passenger cars which reportedly gave better performance than normal tires with tubes, in repeated trial runs. VEB Gummiwerk Riesa, another important tire manufacturer, has also been working on tubeless tires and has conducted tests with a white sidewall tire for passenger cars. No tubeless tires were displayed at the Leipzig Spring Fair 1956, but they are expected to be an important feature of the 1957 Fair.

New synthetic products made by VEB Chemische Werke Buna were to be seen. Included was Buna S4/T, a butadiene-styrene mixed polymer containing 20% bound styrene; it is polymerized at 5° C., requires no special plasticizing, can be compounded with natural rubber, and is said to be suitable for tire treads. Nor does Buna NW, containing 24% bound acrylonitrile, require special plasticizing; it is intended for the manufacture of oil- and fuel-resistant rubber goods and, like Buna S4/T, contains phenyl-beta-naphthylamine as stabilizer and anti-ager. The firm has also introduced Bunalatex S3 for making foam rubber.

Other new latices include Vinalit, PVA latices; Acrylat, polyacrylic esters; Vinitex, a PVC mixed polymer latex.

Silicone oils and stoving lacquers were offered by VEB Chemiewerk Nunchritz, the only East German firm making these products.

Specially treated tung oil and fillers formed the basis of hard as well as flexible products seen in the Communist China Section.

Germany

Classification System For Non-Black Fillers

The individual types of light-colored reinforcing fillers now available differ considerably in their properties and thus are adapted to meet a variety of requirements. However their number has grown to such an extent that a system of classification indicating their most important characteristics has become an urgent need for technologists. F. Endter, of the Physical-Chemical Laboratory of the Degussa concern, Konstanz/Bodensees, and H. Westhinnig, of the same company's rubber laboratory at Kalscheueren, near Cologne, present[1] a scheme for classifying these materials which follows the American pattern for carbon black classification.

To indicate the characteristics of light-colored reinforcers, the abbreviations selected would be bilingual, that is the same letters would indicate the same thing in English and in German. The marks would come under three heads:

(1) Abbreviation indicating processing method of the material, thus:

Abbrev.	German	English
PP	Pyrogene Prozess (Indicating processes which lead to the formation of a solid from molecular dispersions in the gas phase, as the hydrolysis of silicon halides in superheated steam)	Pyrogen Process
TP	Thermischer Prozess (Thermal treatment of solids)	Thermal Process
WP	Wasseriger Prozess (Products precipitated from aqueous solutions)	Wet Process
MN	Modifiziertes Natur Produkt (Natural products that have undergone some after-treatment, coating, for instance)	Modified Natural Product
N	Natur Produkt	Natural Product

(2) Chemical formulae—as SiO_2, Al_2O_3, etc.; for non-stoichiometric compositions would be used the chemical symbols of the main components (insofar as they are present in sufficient proportion and significantly affect results) separated by a slanted line, as Al/SiO_2; Ca/SiO_2.

(3) The efficiency of the material expressed by its reinforcing capacity, as:

Abbrev.	German	English
LR	Leicht Verstärkend	Low Reinforcing
MR	Mittel Verstärkend	Medium Reinforcing
HR	Hoch Verstärkend	Highly Reinforcing
SR	Sehr Hoch Verkstärkend	Super Reinforcing
ER	Extrem Verkstärkend	Extremely Reinforcing

Examples of the use of this classification system for certain non-black fillers (mostly European) follow:

Filler	Classification
Aerosil	PP—SiO_2—ER
AOK I	TP—Al_2O_3—SR
Ultrasil VN 3	WP—SiO_2—SR
Durosil	WP—SiO_2—HR
Calsil	WP—Ca/SiO_2—MR
	WP—$Al/OH/SiO_2$—MR
Coated champagne chalk (whiting)	MN—$CaCO_3$—LR
Whiting	N—$CaCO_3$—LR
Clays	N—Kaloin—LR
	N—SiO_2—LR
	N—SiO_2/Al_2O_3—LR

Record 1955 Production Exceeds Other Industries

The rise in activity in the rubber industry in West Germany, including West Berlin, which started in 1948, has continued unabated and in 1955 reached a new high level; in fact, the rate of development in the rubber industry exceeded the average for all German industries, for while production for the latter showed an increase of 123% in the period 1948-1955, the increase in the case of the former was 184%.

The 1955 output figures for the rubber industry are 50% above those for 1938 which, it should be noted, applied to all of Germany. To be sure, production of certain items, such as bicycle tires, hard rubber goods, rubberized fabrics and products thereof, still has not quite reached the 1938 level, but for others, such as footwear, heels and soles, surgical and mechanical soft rubber goods, it has more than doubled that of the prewar year. Where there is still a lag, this seems chiefly due to the switch in demand, or, as obviously is the case in rubberized fabrics and hard rubber goods, to the encroachment of plastics.

[1] *Kautschuk u. Gummi*, 9, 5, 130 WT (1956).

The switch in demand is very apparent in regard to bicycle tires; though output has risen from year to year, the rate of increase has slowed down considerably (in 1955 it was only 2.8%), because more people are buying motor-scooters and motorized bicycles instead of ordinary bicycles. As to motorcycles, these are being replaced in the public's favor not only by motor-scooters and motorpeds, but also by automobiles, and to such an extent that 1955 figures for motorcycle tires dropped 6.4% from those for 1954. The greater demand for passenger automobiles in Germany reflects the growing prosperity and the consequent urge to a higher standard of living of factory and office workers and officials, and the high 1955 output of passenger-car tires—21.5% above that of 1954—is a direct response to this new trend in Germany.

Production of other tires—for trucks, airplanes, farm and agricultural equipment—showed a strong upturn in 1955, topping the 1954 total by 36.2%. In the latter year, we note, production of these classes of tires for the first time overtook that of 1938, and then by a very small margin.

Below the 1955 production figures (in tons) for the main types of rubber goods are compared with those of 1938 and 1954:

	All Germany	W. Germany and W. Berlin	
	1938	1954	1955
Cycle tires	18,804	15,780	16,241
Motorcycle and passenger-car tires	35,125	45,937	54,270
Heavy-duty and special tires	69,195	69,449	94,428
Tire repair material	5,135	16,048	16,355
TOTAL TIRES	128,259	147,214	181,294
Other rubber goods			
Heels and soles	13,560	41,861	43,889
Footwear	8,000	11,903	15,202
Conveyor belting	6,470	9,077	10,836
Hose with inserts	10,550	11,231	12,807
Other mechanical rubber goods	32,187	51,659	63,054
Surgical rubber goods, etc.	5,909	11,906	15,951
Rubberized fabrics and products	11,116	6,646	7,467
Other rubber goods	20,050	22,544	26,252
Hard rubber goods	10,689	8,999	10,596
TOTAL OTHER GOODS	118,531	175,826	206,054
GRAND TOTAL	246,790	323,040	387,348

The German rubber industry imported 164,556 tons of natural rubber in 1955, against 146,297 tons in 1954, and consumed 134,178 tons, against 119,590 tons. In addition it used 24,216 tons of synthetic rubber (including 11,077 tons of domestic rubber), against 15,617 tons (including 7,066 tons of domestic rubber), the year before. Most of the imported synthetic rubber came from the United States in 1955.

In 1955, the average number of employes, including factory and office personnel, came to 79,186, against 69,971 in 1954, and productivity per worker increased by 4.6%.

Exports of rubber goods in 1955 came to 45,887.5 tons, valued at 240,270,000 DM, which represents an increase of 27.3% in quantity and of 31.9% in value over 1954 figures. By far the greatest part went to European countries (71.1%); Asia took 11.6%; Africa, 6.9%; American countries, 10.1%; and Australia, 1.3%.

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For samples, prices and further particulars apply to our sole agents in Canada

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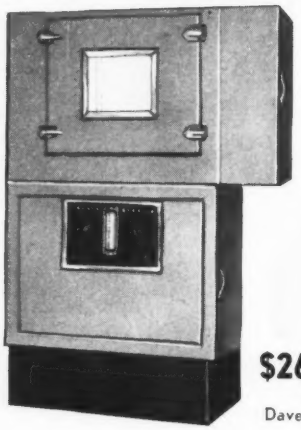
Model 700-1 OZONE TEST CHAMBER



$2680.00
f. o. b.
Davenport, Iowa

Simple to operate

ECONOMICAL
RELIABLE

SPECIFICATIONS

Ozone Concentration Range: 15 to 1,000 pphm
Temperature Range: 5° below ambient to 200° F ±1° F.
Air velocity over sample: 2 feet/second
Chamber dimensions: 20" x 20" x 25" (5.7 cubic feet)
Floor space required: 54" x 28½"
Power requirements: 110-115 volts, 60 cycle, AC

PARTIAL LIST OF USERS

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General Tire and Rubber Co.
U. S. Rubber Company
Mogul Rubber Company
International Latex Corp.
Chrysler Corporation
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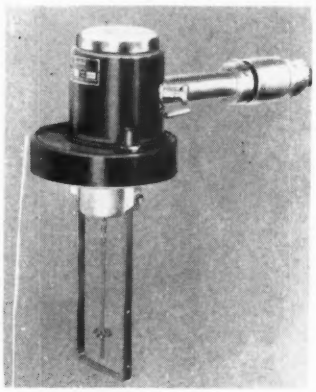
NEW EQUIPMENT

Explosion-Proof Viscometer



Brookfield viscometer

An explosion-proof viscometer for direct measurement of the viscosity or flow characteristics of materials in the chemical industry, where Class I, Group D, hazards are present, has been placed on the market by Brookfield Engineering Laboratories, Inc., Stoughton, Mass. Similar in construction to the company's standard viscometers, the explosion-proof device is completely encased in a machined-from-the-solid aluminum case, and all immersible parts are of stainless steel. The explosion-proof features have been approved by Underwriters Laboratories.

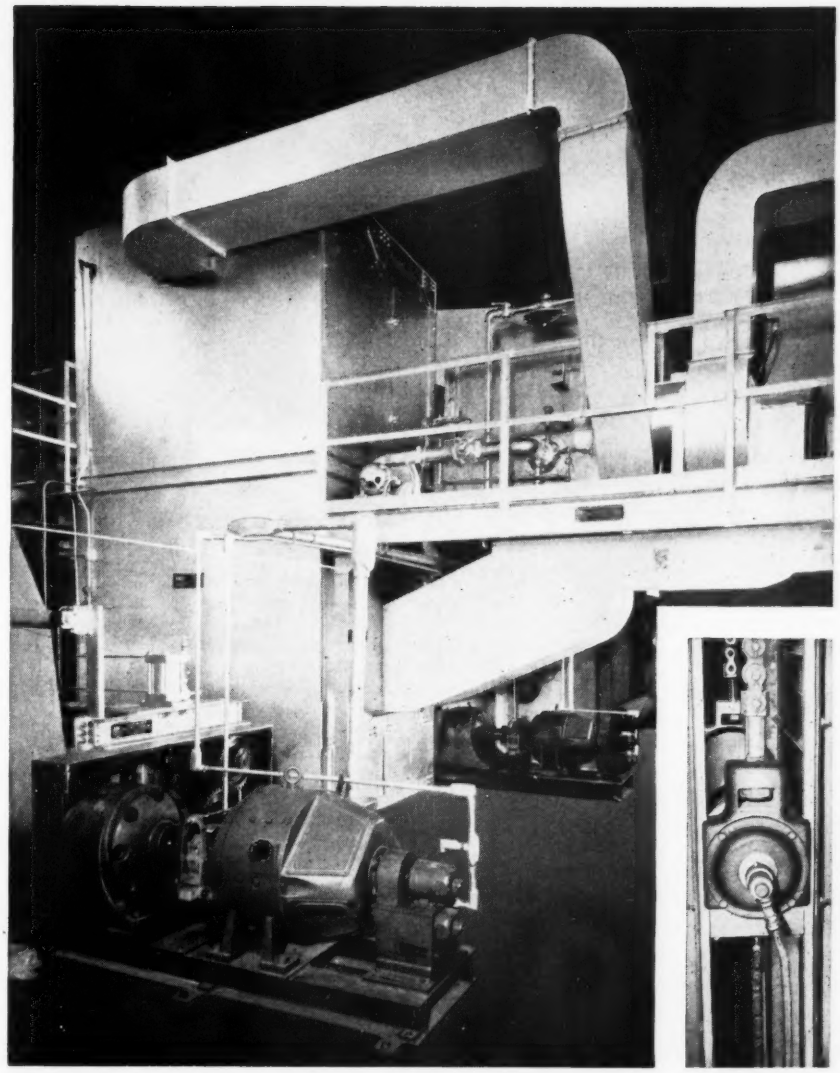
Emmett Type E364 Robotron control

Hydraulic Press Automatic Controller

A unit packaged automatic controller for hydraulic presses has been placed on the market by Emmett Machine & Mfg., Inc., Akron, O. Designated Type E364 Robotron control, the equipment provides for automatic closing of hydraulic presses, freezing of molds at various times, relieving of gases developed within the mold cavity, control of the amount of press opening at each bump, and accurate and overall timing.

Emmett also reports that the Robotron features the very latest developments of components and techniques, including operating push-buttons on the case, the inclusion of the solenoid air valve within the case, and the flexibility of cycle set-up in seconds.

According to the company, the push-button section on the keyboard represents the early intervals of time during the curing process, and each push-button, when operated, will close the hydraulic press to bump for gas removal and to reclose the number of bumps, with time intervals readily controllable. The Robotron is said to be easily installed, serviceable, airtight, and dust-proof.



Within the first day of startup, full width nylon tire cord processed in this 30-yard-per-minute, 14,000-pound-tension **IOI** Rollevator® Oven*, was made into aircraft tires meeting all qualification tests.

The Rollevator® roll automatically moves up and down within the oven, in direct relation to line speeds. Thus, at *any line speed, heat-exposure* time of the nylon is held *constant* at a constant temperature setting and at constant tension.

Rollevator® Oven* hot stretches nylon tire cord at constant optimum temperature, constant time and constant tension, at variable line speeds

The IOI Rollevator® Oven* is the answer to more uniform hot stretching of nylon with greater production efficiency. Simple and automatic in operation, it practically eliminates costly shutdown and repair time. When the line is stopped the Rollevator® roll automatically lowers out of the heat zone, eliminating the need for quick cool purging of the oven and the time and expense involved in reheating the oven when starting up again. Its low operating cost combined with low initial cost assures you of lower production cost. An IOI sales engineer will be glad to give you complete information about the Rollevator® Oven* and to discuss your requirements for any system from 3 to 100 yards per minute.

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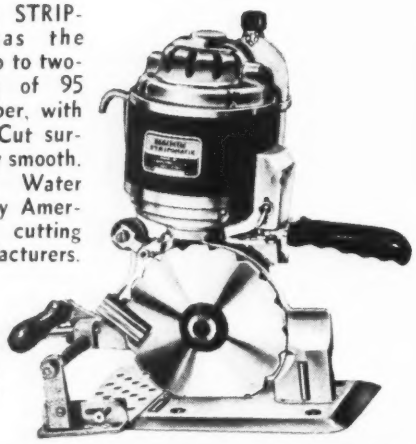
The MAIMIN STRIP-O-MATIC has the power to cut up to two-inch thickness of 95 Durometer rubber, with portable ease. Cut surface is perfectly smooth. Sturdy gauge. Water cooler. Made by America's foremost cutting machine manufacturers.



Send sample of your rubber or rubber composition material for test cutting. No obligation.

H. MAIMIN CO., INC.

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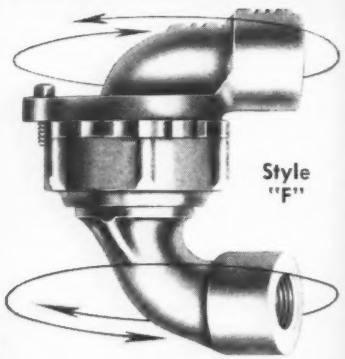

For unrestricted flow of steam, air, or fluids through moving pipe lines or to equipment in motion.

Complete 360° swing. The strength of pipe with the flexibility of hose. Only four parts assure long wear, low maintenance. No springs, small or loose parts. Four styles in standard pipe size, ¼" to 3".

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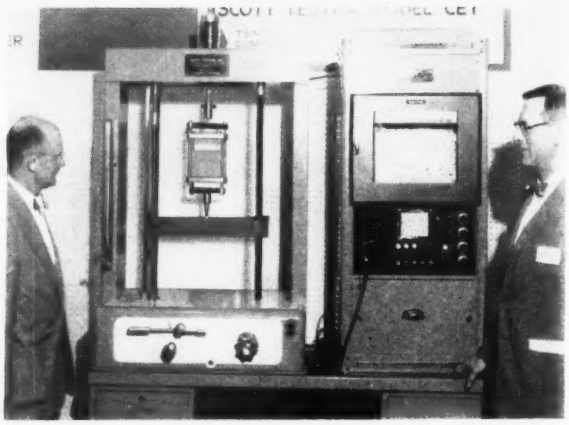


Scott Tester Model CET with recorder console

Constant-Rate-of-Elongation Tester

A constant-rate-of-elongation tester designed to test many different types of materials and constructions for tensile, hysteresis, and compression within the range of 0-2,000 pounds has been announced by Scott Testers, Inc., Providence, R. I. Designated Model CET, it has a range of speeds up to 40 inches per minute, lengths of stroke up to 72 inches, and infinitely variable loading between 0 and 2,000 pounds. The electric weighing system is said to permit the most detailed analysis of the specimen under test by having an accuracy within 0.25%, maintained at all stages of the test cycle, and freedom from inertia.

Stretch of the specimen can be magnified on the chart up to 200 times actual, the company declares. A selected significant portion of the stress-strain curve can be isolated and shown full span on the chart, magnified up to 10 times. Specimen elongation is effected by downward motion of the lower crosshead, driven by double screws operating in so-called "ball nut" housings. Compression testing is accomplished by the same action of the machine, with the specimen in a fixture which exerts compressive force and has a capacity for specimens 15 inches square up to 20 inches high. For hysteresis testing, the cyclic action of the lower crosshead may be actuated manually, or may be set to continue downward and reverse cycle automatically, with instantaneous change of direction at bottom and top stroke.

Model CET, as a short stroke tester, is 33½ inches wide, 30 inches deep, and 56 inches high. The recorder console for bench mounting is 22 inches wide, 19 inches deep, and 48½ inches high. The long stroke tester, with a maximum stroke up to 72 inches, is floor mounted, and its recorder console stands on the floor beside it.

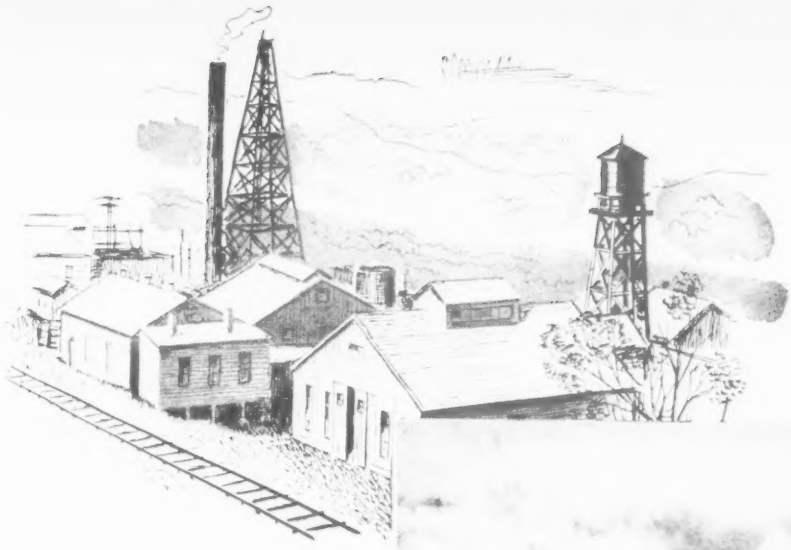
Mayer Chil-er Recirculating Units

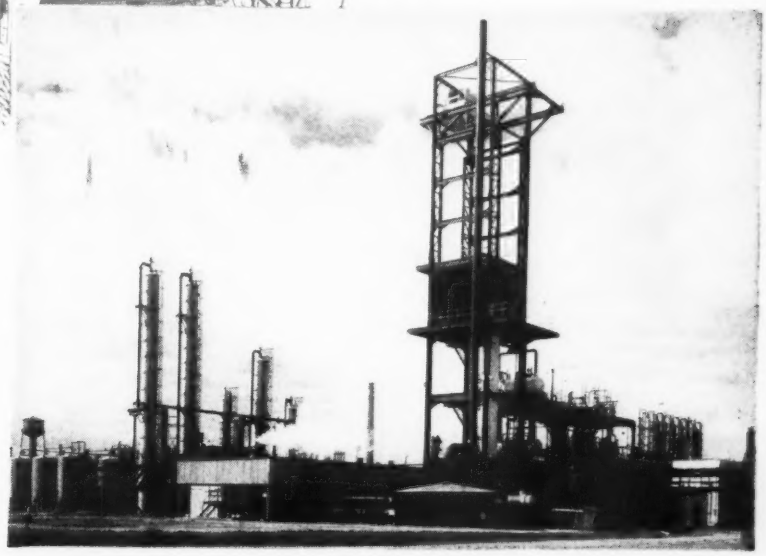
A line of equipment for continuously and automatically removing process heat during manufacturing operations is available from Mayer Refrigerating Engineers, Inc., Lincoln Park, N. J. Designated Chil-er recirculating units, they are said to combine all the components of a complete central refrigerating system, in a single, pre-assembled, portable unit. The recirculating pump, pump motor, storage tank, automatic controls, internal piping, internal wiring, and insulation are included in each unit.

The equipment is said to be vibration-free and requires no foundation or bolting down. In addition to automatic controls, each unit is equipped with anticipating signal alarm which can be remotely mounted, if necessary. A single switch starts and stops each unit. According to the company, the cooling liquid is lowered to the desired temperature in four to five minutes, and that temperature is automatically maintained within ± 2° F. until the unit is manually stopped.

Models in a wide range of sizes are available, handling from six to 500 gpm. A brochure describing the equipment, Bulletin CH-3D, may be obtained from the company.

(Continued on page 126)





design makes a difference

. . . . . .

and

FLEXOL PLASTICIZER 10-10 *is designed for low volatility*

Trade Mark

In plasticizers as in chemical plants, design is important. CARBIDE's Oxo unit at Texas City, Texas, shows progress in plant design from our original plant at Clendennin, West Virginia. And primary decyl alcohols from the huge Oxo unit are used in making FLEXOL Plasticizer 10-10 (didecyl phthalate), CARBIDE's newest plasticizer.

FLEXOL 10-10 is designed specifically to give you low volatility combined with outstanding electrical properties, improved resistance to water extraction, and excellent heat and light stability. Plastisols prepared with 10-10 have better viscosity stability.

You will find that FLEXOL 10-10 provides additional performance characteristics in your calendered film and sheeting, profile extrusions, electrical insulation, coated fabrics, slush-molded or dip-molded articles, and other vinyls that require low volatility.

Continuing progress in raw materials production enables CARBIDE to design top-quality plasticizers for you. Our basic raw materials position also means a continuing supply of 10-10 in the quantities you need.

Get all the information on this newest, least volatile phthalate from the nearest of CARBIDE's 25 sales offices. In Canada: Carbide Chemicals Company, Division of Union Carbide Canada Limited, Toronto.

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NEW MATERIALS

Dow Corning Fluoro-Silicone Rubber

The first commercially available fluoro-silicone rubber, one that withstands swelling by aircraft fuels and oils and remains rubbery in the temperature range of —80 to 400° F., has been developed by Dow Corning Corp., Midland, Mich., in collaboration with the materials laboratory of the Wright Air Development Center of the Air Research and Development Command.

Designated Silastic LS-53, the rubber is said to combine the ease of fabrication of silicone rubbers with the solvent resistance of fluorocarbon plastics. It has the tensile strength, ultimate elongation, and compression set of conventional silicone rubbers and the swelling resistance to gasoline, jet engine fuels, hydraulic fluids, engine oils, and certain solvents of the fluorocarbons. The first application of the new rubber will be in jet engine O-rings and other types of seals.

Silastic LS-53 will be supplied as a fully compounded material. It can be vulcanized in five minutes at 260° F. The suggested after-cure is 24 hours at 300° F. in an air-circulating oven.

Typical properties of the new rubber have been reported as:

Color	Red
Specific gravity	1.4
Hardness, Shore A scale	50
Tensile strength, psi.	800
Elongation, %	250
Compression set, %	30
Water absorption, 70 hrs. @ 212° F.	
Durometer change	—2
Volume change, %	+3
Brittle point, ° F.	—90

Silastic LS-53 is described fully in the publication "Silastic Facts," Reference 9-370, which is available from the company.

UCC Aeronautical Vinyl Silicone Rubbers

A series of five vinyl silicone rubber compounds for high-temperature aeronautical application is being made commercially available by the silicones division of Union Carbide & Carbon Corp., New York, N. Y. Designated K-1044R, K-1045R, K-1046R, K-1047R, and K-1048R Silicone Rubber Compounds, they are described as "preconditioned" because they are shipped in a condition that calls for only a minimum of mill freshening to make them ready for fabrication.

Ranging in durometer hardness from 40 to 80, after a postcure of 24 hours at 480° F., the K-1040's are said to feature high tear and tensile strength, high elongation properties, low compression set, good oil resistance, low moisture absorption, and good dry and wet dielectric properties. The compounds also have the so-called controlled reactivity of UCC's earlier-announced K-1020 and K-1030 series.

According to the company, the K-1040's for the first time supply the rubber fabricator with single compounds that meet the Aeronautical Materials Specifications (AMS), the joint military rubber (Mil-R), and American Society for Testing Materials (ASTM) specifications in the appropriate hardness. The vinyl silicone rubber compounds are also expected to find use in certain civilian applications, such as in home appliances.

The K-1040's are being supplied uncatalyzed or with a catalyst specified by the fabricator.

Some typical reported properties of the series, upon mold curing, are as follows:

	K-1044	K-1045	K-1046	K-1047	K-1048
Hardness, Shore A	37	42	47	52	56
Tensile strength, psi.	950	950	950	950	950
Elongation, %	500	500	500	500	500
Tear strength, Die B, pi	75	75	80	85	90

'Mike' and 'Moe' SAY:
"TAKE IT FROM US... THIS NEW SILICONE DEFOAMER KILLS FOAM AS EFFICIENTLY AND ECONOMICALLY AS DOW CORNING MOLD LUBRICANTS RELEASE RUBBER."

This underwater photo dramatically illustrates speedy dispersibility of new Dow Corning Antifoam B.

NEW silicone defoamer gives you the ultimate in foam-killing convenience

ANTIFOAM B

FAST ACTING New Dow Corning Antifoam B disperses immediately in aqueous solutions. No stirring or agitation required.

READY TO USE Just add "as is" . . . No delays for diluting or mixing. No need for extra containers.

LASTS LONGER Will not oil out, plate out, settle or precipitate in most applications. Ideal for continuous processing.

STABLE Long storage life — stays uniform even if frozen or boiled. Retains effectiveness after sterilization.

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Clean properly before preparing metal for rubber bonding

new ideas in cleaning for the rubber industry

BEFORE metal can be conditioned for rubber bonding, it first must be freed of soils. It must be properly etched to provide a receptive surface. Otherwise the adhesive cement cannot develop a strong tenacious hold. Also, it must be left inert to prevent corrosion from forming under the rubber.

Regardless of the size or volume of work, type of metal or soil, Oakite offers several methods of conditioning metal surfaces for rubber bonding—by barrel, tank or hand. Also a wide number of Oakite materials for use on steel, iron and aluminum.

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Dipac Delayed-Action Accelerator

A delayed-action accelerator designed for high-temperature processing where maximum freedom from scorch is essential has been added to the synthetic organic chemical line of Sharples Chemicals Division, Pennsylvania Salt Mfg. Co., Philadelphia, Pa. Called Dipac, the diisopropyl benzothiazyl-2-sulfenamide is said to have a cure rate comparable to that of other thiazole accelerators. Light tan in color and flaky in physical appearance, Dipac melts between 55 and 59° C.

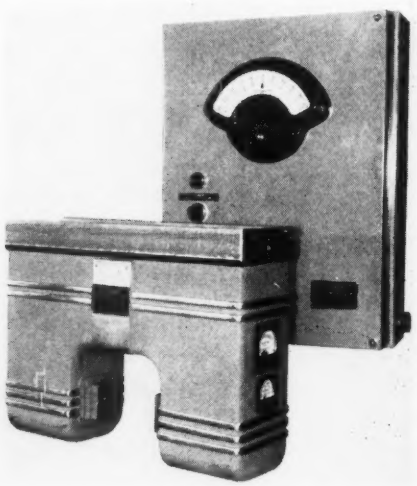
Data sheet S-106, giving the scorch times and cure data for Dipac in compounds of *Hevea* rubber, SBR 1500, and oil-extended SBR, is available on request from the company.

Avisco Fine Denier Super Rayon Yarn

A fine denier super rayon yarn is now being produced by American Viscose Corp., Philadelphia, Pa., as an addition to its range of industrial rayon yarns. The yarn will be available in 1100 to 2200 denier, with or without twist, 1.0 to 2.25 denier per filament. Each type is offered in a wide choice of strength and other physical characteristics, Avisco says. In the low denier, super Rayflex type, the Avisco tire cord is said to approach nylon strength characteristics while remaining within the rayon price range. The new product is the first of the company's high-strength yarn to be offered in low deniers per filament.

New Equipment

(Continued from page 122)



Industrial Gauges Corp.'s Microlimit Control

Photoelectric Control for Extruded Cable

A photoelectric device for the measurement and the control of the diameter of extruded thermoplastic rubber or plastic insulation for wire and cable is being offered by Industrial Gauges Corp., Englewood, N. J. Called Microlimit Control, the equipment is designed for installation between the extruder's water trough and permits non-contact measurement and control of diameters in the range of 0.4 to 3.0 inches. A circuit design makes the measuring beam of light insensitive to changes in intensity due to smoking of the hot jacketing compound at the extruder, allowing control of diameters based on measurements made fractions of seconds after extrusion, according to the company.

In starting, the extruder operator can bring his cable up to diameter with a minimum of waste, and when up to nominal extruder and capstan speeds, the diameter can be held to precise tolerances automatically, Industrial Gauges reports. Cable is scanned 240 times a second, and accuracy and repeatability are said to be within 0.001-inch throughout the range.

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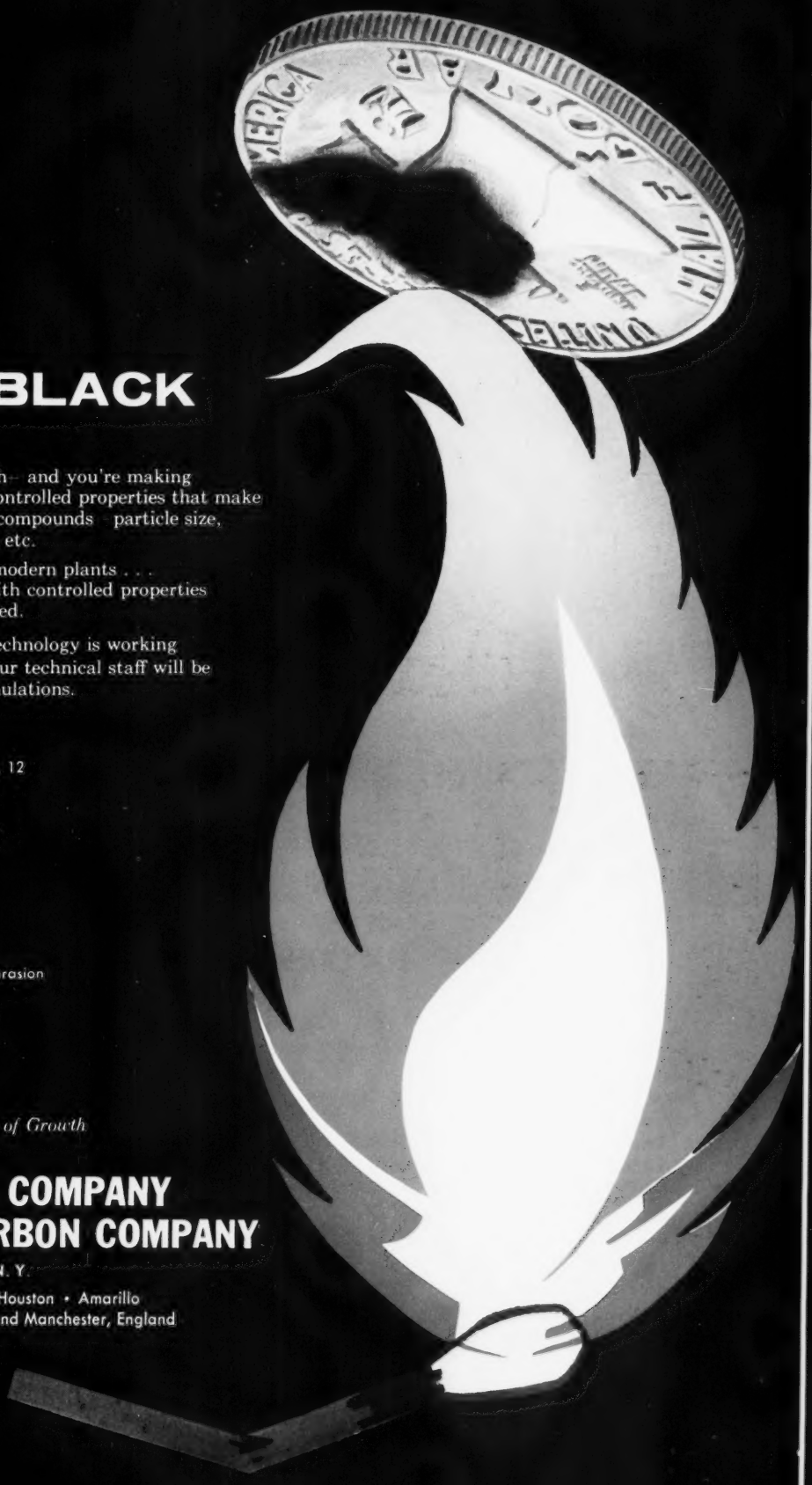
ORLD

Here's **ONE** way to make **CARBON BLACK**



. . . a coin in the flame of a match — and you're making carbon black. But not with the controlled properties that make the big difference in your rubber compounds — particle size, conductivity, abrasion resistance, etc.

Witco-Continental operates five modern plants . . . offers a complete line of blacks with controlled properties for every rubber compounding need.

Every advance in carbon black technology is working for you at Witco-Continental. Our technical staff will be glad to assist you with your formulations.

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Continental A — (MPC) — Witco No. 1
Continental F — (HPC) — Witco No. 6
Continental R-40 — (CC) — Conducting

FURNACE BLACKS

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Continex SRF-NS — Non-Staining
Continex HMF — High Modulus
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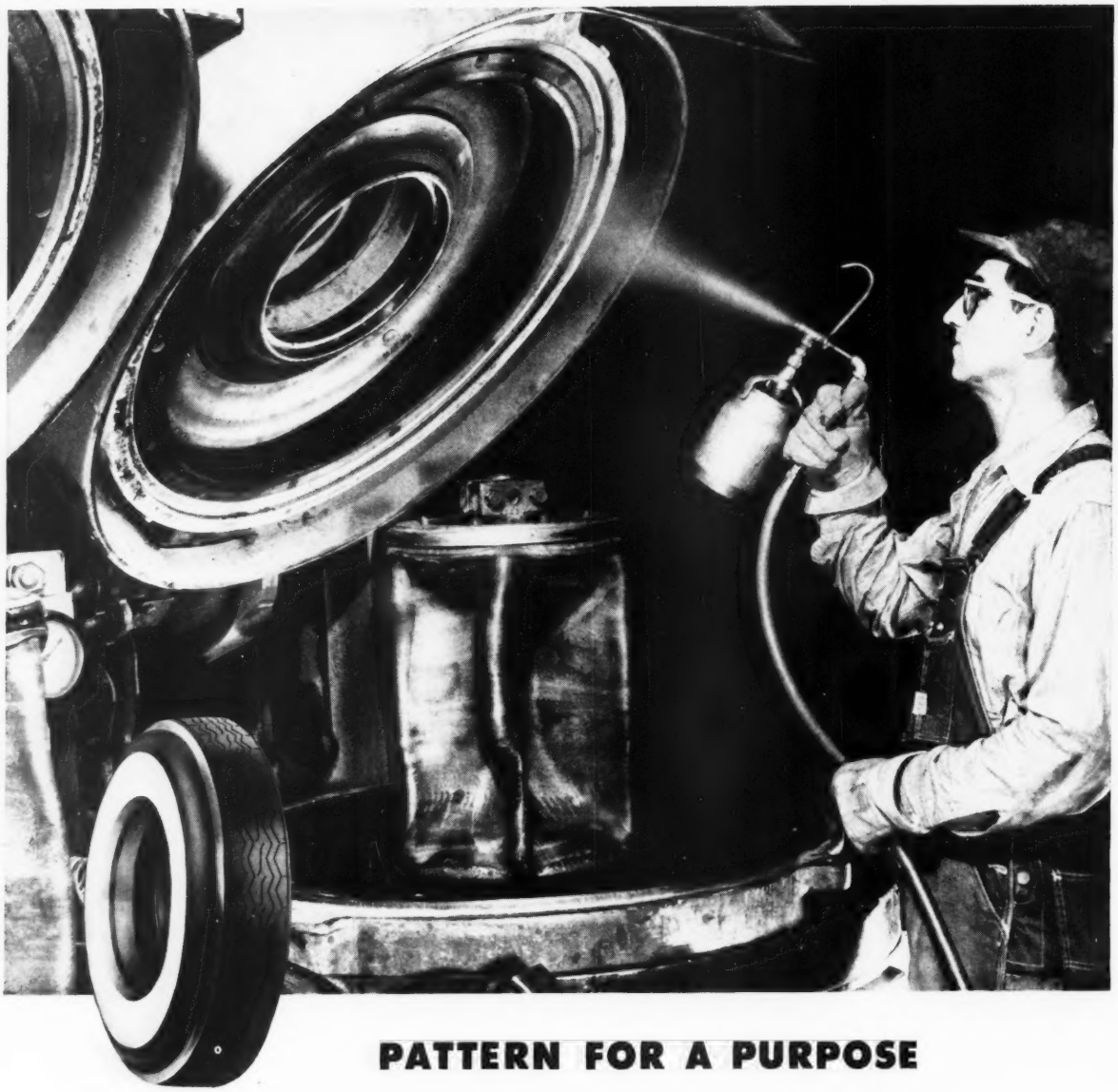

PATTERN FOR A PURPOSE

Why one type of tread design, rather than any other? Because it has been calculated to offer the most in road holding with a minimum of wear. There's a precise reason for every tiny slot, every angle . . .

How do you know it's right? Because years of painstaking research by the tire industry are visualized in this pattern . . . a part of the ever-continuing effort to provide safer, surer transportation.

How is it possible to make those thousands of thin grooves? Because with "super slippery" *UNION CARBIDE* silicone release agents, very thin-section molds can be used in standard forming equipment without prohibitive costs.

As reported to us by one manufacturer using silicone release agents for the past eight years: "They reduce blemishes on treads, permit complicated treads not possible without silicones and eliminate mold cleaning."

The SILICONES DIVISION is one of the leading suppliers of silicone release agents for the rubber industry. Find out how these silicones can be adapted to your needs. Contact one of the offices of our distributor The C. P. Hall Co., or write to Silicones Division, Dept. RW-10.

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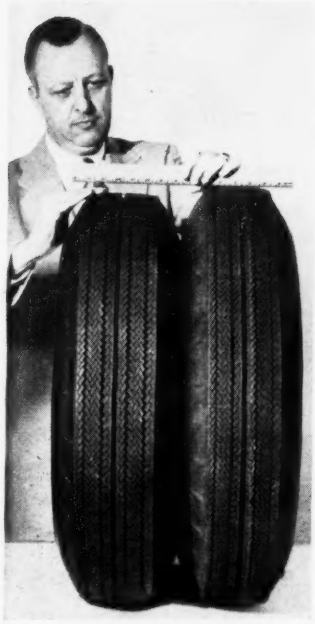
NEW PRODUCTS



Custom Super-Soft Cushion, *left*, with Standard 15-inch tire

Goodyear 14-Inch Tire

A new line of 14-inch-diameter tires for both original equipment and replacement use is being placed on the market by The Goodyear Tire & Rubber Co., Akron, O. Called Custom Super-Soft Cushion, the tubeless tire is constructed of both nylon and rayon cord and is designed for operation at 22 pounds psi., an 8% decrease from the 24 pounds of air pressure which characterizes the 15-inch tire.

Although the wider cross-sectioned 14-inch tire is larger and weighs about a pound more than the 15-inch tire, it is smaller in overall height. Tire section has been increased an average of one inch, and rim width hiked a half-inch. Also, the loaded radius, or axle height, has been reduced about a half-inch.

Mobile Home Tubeless

Another tubeless tire is also being marketed by Goodyear. This one is for mobile homes. The tire, newly designed rim and wheel unit lowers the overall diameter of the assembly 3.8 inches without affecting load capacity. The new assembly means greater stability for mobile homes and eliminates the need of wheel wells, which have placed restrictions on the design of the interior.

The tire, of nylon cord construction, is available in 7-14.5 and 8-14.5 sizes; tire rim is 6.00 x 14.5. The outside diameter of the 7-14.5 mobile home tire is 26.35 inches. Carrying capacity is 2,180 pounds a tire.

Rib Hi Miler Truck Tires

What is called a new five-rib tire in the low-price range has also been developed by Goodyear, Akron, O. Called Rib Hi Miler, the tire has a tread design similar to the company's Traction Hi Miler and will replace its Hi Miler Rib line of truck tires. Cord construction of the new tires is of rayon, and both tubed and tubeless models are available. Sizes of the tubed construction are the same as those of the Hi Miler Rib line. Tubeless sizes are 15- and 16-inch.

Firestone Rubber Furniture Webbing

A molded rubber webbing designed for use as a base for cushioning chairs, sofas, and sleeping equipment is being made available by The Firestone Tire & Rubber Co., Akron, O. Called Diatex, it is said to be a strong, resilient, all-white rubber webbing which eliminates the need of steel springs. Bonded to the rubber at each end is a metal clip by which the webbing is attached to furniture frames.

Said to be especially applicable to the company's Foamex cushioning, the webbing permits a wider range in styling than

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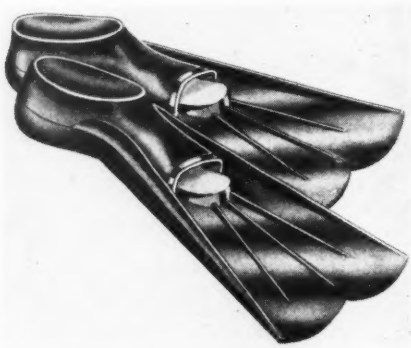
Firestone's Diatex all-rubber webbing on chair of Cal-Mode Furniture Mfg. Co.

conventional suspensions and makes advanced designs practical and economical, according to Firestone. The webbing is ¼-inch thick, 1¾ inches wide, and comes in lengths of 18, 19, and 20 inches, with other lengths available on order. The rubber is compounded for installation under low stretch and is age-tested.



Martin's "Flying" Fish Fins

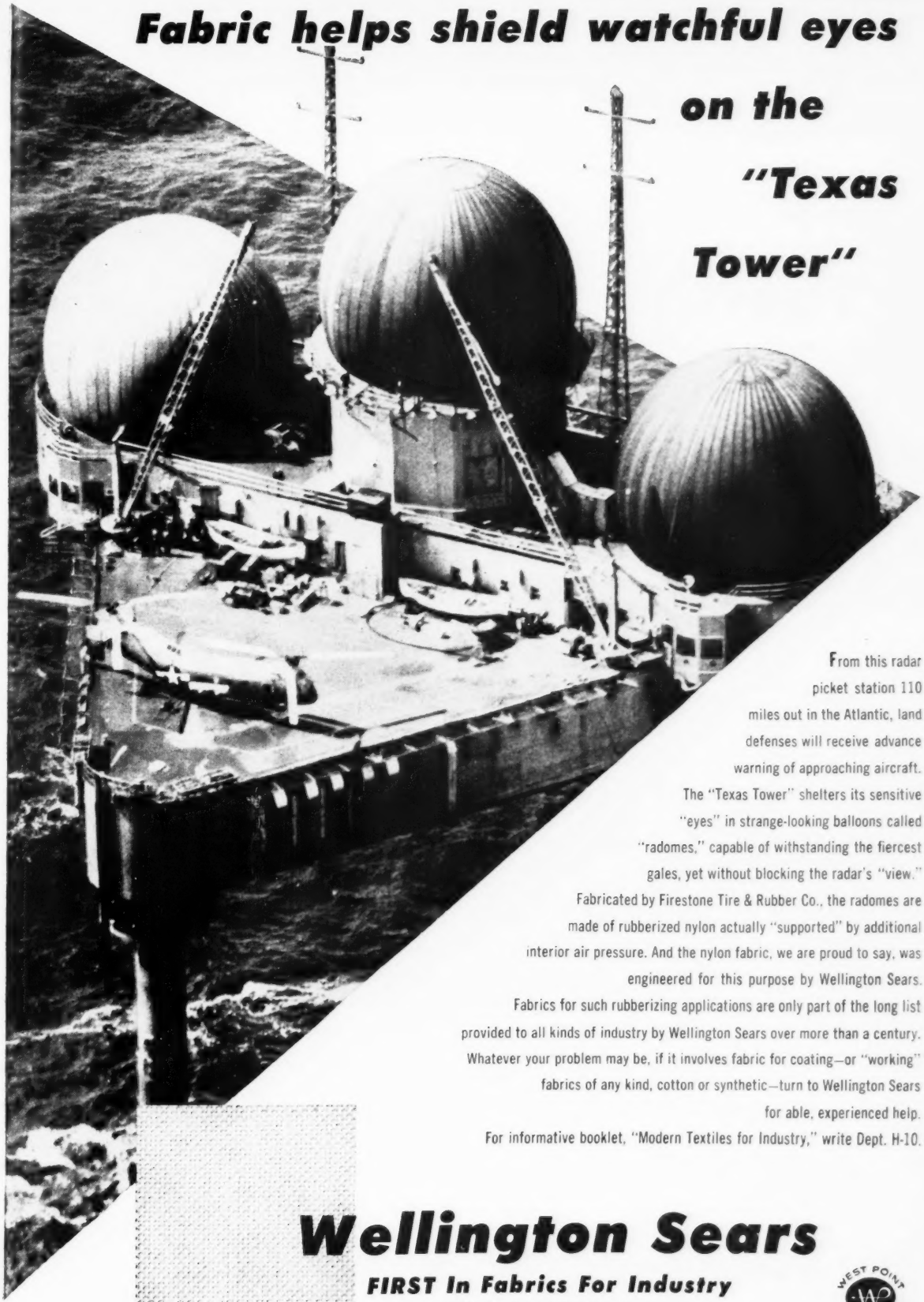
Aqua-Diving Rubber Fins

European-type rubber fins for underwater swimming are being made available by Martin Rubber Co., Inc., Long Branch, N. J. Dubbed "Flying Fish Fins, they are constructed of glossy black rubber stock, rigid in the propelling surface and flexible and soft in the foot part. Sizes are large and medium. The fins are also being offered in combination with the company's "Flying" Fish Mask.

U. S. Sponge Rubber Rug Underlays

Three new sponge rubber carpet underlays have been placed on the market by United States Rubber Co., New York, N. Y. U. S. Luxuryliner, designed for the quality market, is made of a thick, resilient sponge compound and is available in 36- and 53-inch widths. U. S. Skyliner and U. S. Airlane, designed for volume selling, are ¼-inch thick, 53 inches wide, and have a design on their undersides that is said to anchor them securely to the floor and to provide circulation of air. All three underlays have a strong fiber backing and are claimed to be permanently resilient and impervious to insects.

Fabric helps shield watchful eyes on the "Texas Tower"



From this radar picket station 110 miles out in the Atlantic, land defenses will receive advance warning of approaching aircraft. The "Texas Tower" shelters its sensitive "eyes" in strange-looking balloons called "radomes," capable of withstanding the fiercest gales, yet without blocking the radar's "view." Fabricated by Firestone Tire & Rubber Co., the radomes are made of rubberized nylon actually "supported" by additional interior air pressure. And the nylon fabric, we are proud to say, was engineered for this purpose by Wellington Sears.

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TECHNICAL BOOKS

BOOK REVIEWS

"Rubber in Automobile Engineering." By R. Dean-Averns. Natural Rubber Development Board, London, England. Cloth cover, 5½ by 8¾ inches, 206 pages. Price, 75¢ from the Natural Rubber Bureau, Washington, D. C.

This book is a summary of the uses of rubber in the motor industry, from the theoretical principles of construction to examples of their application in many different makes of vehicles. Covered are such subjects as engine vibration problems, suspension systems, the pneumatic tire, steering and braking systems, rubber in units attached to the body or frame of the car, rubber in electrical fittings and hose, rubber in body building and mounting, and rubber in door mountings, glazing, panels, and flooring. More than 100 photographs, drawings, and data graphs illustrate the text.

The author was formerly chief engineer for a number of English automobile manufacturers and is well qualified to pioneer in work of this type. The material in the book deals almost exclusively with rubber in automobiles of English manufacture.

"The Chemistry and Technology of Waxes." Second Edition. Albin H. Warth. Reinhold Publishing Corp., New York, N. Y. Hard cover, 6¼ by 9¼ inches, 940 pages. Price, $18.

The many new developments in wax research and technology since the first edition of this text was published in 1947 have been included here, together with new illustrations, charts, tables, and literature and patent references. Additional space has been devoted to a survey of the petroleum waxes because they have been growing in importance since the introduction of microcrystalline waxes and their emulsifiable derivatives. Recent strides in the petrochemical industry also prompted an expanded treatment of the polyethylene waxes, the most important contribution to the field of synthetic waxes made over the past several years. The industrial application of waxes, too, has been delved into to a greater extent.

The book's contents have been divided into the following chapters: introduction; chemical components of waxes; the natural waxes; fossil waxes, earth waxes, peat waxes, Montana waxes, and lignite paraffins; petroleum waxes; synthetic waxes; commercial modified, blended, and compounded waxes; emulsifiable waxes, waxy alcohols and acids, metallic soaps; methods for determining the constants of waxes; and wax technology—uses in industry.

Four appendices are included: tables of physical constants of waxes; the compounding of waxes; author index; and subject index.

NEW PUBLICATIONS

"Farrel-Birmingham 6″ x 13″ Laboratory Mills for Rubber and Plastics." Bulletin 203. Farrel-Birmingham Co., Inc., Ansonia, Conn. 12 pages. General and electrical specifications of six of the company's standard models of laboratory mills for rubber and plastics are presented in this illustrated catalog.

"Neville Products to Make Your Products Better." Neville Chemical Co., Pittsburgh, Pa. 8 pages. Specifications, applications, solubilities, and compatibilities of the company's wide range of resins are covered in this catalog. Information is also included on Neville anti-skinning agents, plasticizing oils, rubber antioxidants, rubber reclaiming oils, and solvents.

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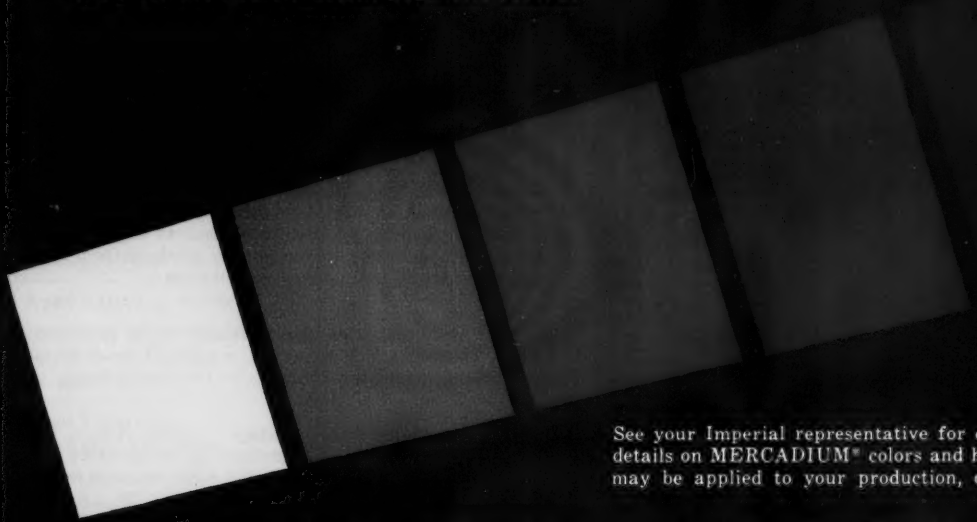

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"Giffels and Vallet, Inc., L. Rossetti." Giffels & Vallet, Inc., L. Rossetti, Detroit, Mich. 102 pages. The company's architectural and engineering services are described in this brochure. Included are photographs of many of the projects it has done for the rubber industry, such as the design and construction of Sheller Mfg. Corp.'s Portland, Ind., plant; Yale Rubber Mfg. Co.'s Sandusky, Mich., plant; The General Tire & Rubber Co.'s Waco, Tex., plant; and The Firestone Tire & Rubber Co.'s Des Moines, Iowa, plant.

"Marvinol VR-12." Bulletin No. 3. Naugatuck Chemical Division, Naugatuck, Conn. 12 pages. The properties, compounding, and processing of Marvinol VR-12, a medium oil absorption, small particle size polyvinyl chloride resin for general-purpose use, are discussed in this illustrated booklet.

"Silastic Facts." Reference 9-364. Dow Corning Corp., Midland, Mich. 2 pages. The specifications and properties of Silastic 125, a low consistency silicone rubber paste that is serviceable at temperatures from —70 to 500° F. and is useful in a variety of coating or calking applications, are discussed in this publication.

"ASTM Standards on Rubber Products." 1956 Edition. American Society for Testing Materials, Philadelphia, Pa. 746 pages. Price to members, $4.40; to non-members, $5.75. Every ASTM standard relating to rubber and related products is included in this latest compilation. The volume contains 158 standards, 91 test methods, 38 specifications, 23 recommended procedures, and six definitions. Thirty-three of these are recently revised standards. Proposed methods for testing rubber threads are included in the appendices. A list of members of the ASTM Committee D-11 on rubber and rubber-like materials is also given.

"Chlorowax LV." Diamond Alkali Co., chlorinated products division, Cleveland, O. 5 pages. This liquid chlorinated paraffin, a secondary plasticizer for vinyl resins, is described, and four typical vinyl resin formulations utilizing it are presented in this technical bulletin.

"Keeping Tabs on Acrylonitrile." American Cyanamid Co., petrochemicals department, New York, N. Y. 26 pages. A series of 12 reactions of acrylonitrile with hydroxyls, amines, halides, water, amides, olefins, aldehydes and ketones, and other chemicals are diagrammed and discussed in this little booklet.

"Irrathene." Technical Report CDD-I-2. General Electric Co., chemical and metallurgical division, Pittsfield, Mass. 12 pages. The physical, electrical, and mechanical properties of G-E's irradiated polyethylene insulating tape, together with suggested applications, are contained in this illustrated booklet. Irrathene is said to combine adequate resistance to temperature surges from overloads with the exceptionally good electrical and physical properties of conventional polyethylene.

"How to Specify Corrugated Boxes." Hinde & Dauch, Sandusky, O. 24 pages. This booklet is an aid to manufacturers in determining needed specifications for corrugated boxes.

"Precision Radial Roller Bearings." Rollway Bearing Co., Inc., Syracuse, N. Y. 56 pages. Specifications, performance data, and applications of the company's radial roller bearings are reported in this catalog-manual.

"Flammable Liquids." Vol. 4, Nos. 2, 3, 4. Protectoseal Co., Chicago, Ill. 8 pages. This series of publications describing and illustrating the nature and safe use of flammable liquids is bound in loose-leaf cover and available to plant personnel.

"Comparative Coatings Chart." J. Landau Co., Carlstadt, N. J. The chemical resistances, physical properties, and application data of the company's Lankote vinyl-alkyd, vinyl, chlorinated rubber, silicone, epoxy, epoxy-phenolic, and fluorocarbon coatings are compared in this engineering chart.

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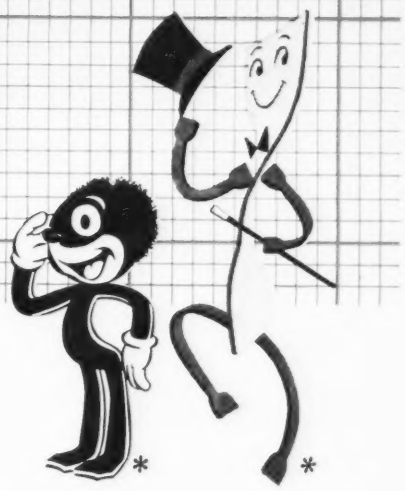

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SUMMARY OF PHYSICAL PROPERTIES

	PHILPRENE VP-15	PHILPRENE VP-25	PHILPRENE VP-A
Original			
Tensile, psi	2320	2540	2350
Elongation, %	190	185	285
Shore A Hardness	75	80	68
Resilience	46	40	52.4
Gehman Freeze Point, °F	−80	−56	−49
Heat Build-up, △ T °F	72.4	74.7	74.7
Blowout, min	>60	>60	>60
Blowout, △ T °F	122.7	124.5	132.0
Aged 2 Days in 70/30 Isooctane/Toluene at 158°F			
Volume Swell, %	44.4	37.6	18.9
Extracted, %	8.8	9.1	8.7
Aged 3 Days in Turbo Oil-15 at 300°F			
Tensile, psi	570	590	500
Elongation, %	70	60	70
Volume Swell	21.3	18.6	19.4

Basic Compounding Recipes

Philprene VP-15 or VP-25	100	—
Philprene VP-A	—	100
MT Black	150	150
Zinc Oxide	5	5
Stearic Acid	1	1
Sulfur	0.25	0.25
Benzothiazyl Disulfide	3	3
TM Thiuram Disulfide	2	2
B-L-E	3	3
Plasticizer SC	20	20
p-Xylene Hexachloride	10	5

Cure: 45 minutes at 307°F

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Reprints for Sale

The following reprints of the very popular and informative articles which appeared recently in RUBBER WORLD may be had at the prices indicated:

GR-S Type Synthetic Rubber—Present and Possible Future Trends. By R. G. Seaman. **50¢** each.

Accelerators Curing Systems. Akron Rubber Group Symposium and Panel Discussion. **35¢** each.

"Rubber Railroads." By F. W. Blanchard. **25¢** each.

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Publications of Merck & Co., Inc., Marine Magnesium Division, Rahway, N. J.:

"Maglite D in 'Hypalon.'" Bulletin 5607A. 22 pages. The physical and chemical properties of the company's magnesium oxide and its use in "Hypalon" stocks during mixing and processing, during vulcanizing, in vulcanized stocks, and in solvent cements and coatings are described in these data sheets. Recipes employing Maglite D in "Hypalon" stocks are given, as well as postcure test data.

"Maglite D in Neoprene." Bulletin 5606B. 19 pages. Neoprene recipes employing Maglite D for a wide range of applications are reported on these data sheets, together with postcure test data. The advantages of Maglite D are again discussed.

Publications of E. I. du Pont de Nemours & Co., Inc., elastomers division, Wilmington, Del.:

"Swelling of Neoprene in Chemicals, Oils and Solvents." Report No. 56-2. 36 pages. K. W. Malcolmson and D. C. Thompson. Data are presented showing the volume change of various neoprene compounds after immersion in a large number of chemicals, oils, and solvents. The publication expands on a previously issued report on the subject, Report BL-223, prepared in 1948.

"Neoprene in Butyl Curing Bags and Bladders." W. J. Schrantz. Report BL-317. 2 pages. How the replacement of ten parts of butyl rubber by Neoprene Type GN-A or Type W in tubeless tire curing bags and bladders prevents excessive softening of the bags and extends the number of heats obtainable with them is discussed in this report.

"Neoprene Notebook." No. 70. 8 pages. Among the subjects discussed in this issue are the chemical resistance of neoprene and the application of the rubber as Karbate pump components, solvent hose, aerial power cable, valve seats, coal conveyor belt, and flexible valve body.

"Facts about 'Hypalon'." No. 4. 2 pages. The superior resistance of "Hypalon" to oxidizing chemicals and to non-oxidizing agents is discussed in this issue and documented with a case history.

Publications of Harwick Standard Chemical Co., Akron, O.:

"Stan-Tone Dry Colors." Bulletin #02-175-3-7-56. 4 pages. The physical properties of the company's organic and inorganic Stan-Tone dry colors for rubber and vinyl compounding are listed in this bulletin.

"Coumarone Indene Resins." Bulletin #12-64-6-8-56. 6 pages. The functions and advantages of the firm's Piccoumaron resins in natural and synthetic rubber compounding are discussed in this publication, together with the physical properties of the resin line. Included is a softener study of the resins in SBR compounds.

"Flock." Bulletin #17-96-1-7-56. 2 pages. The specifications, grades, and applications of Harwick-distributed reclaimed cotton flock are reported here.

"Casein Comparisons." Bulletin #26-55-1-7-56. 1 page. Physical properties of the company-distributed casein are compared to those of other caseins on the market. A standard casein test is described.

"Newsletter." September 1, 1956. Rubatex Products, Inc., Melrose, Mass. 3 pages. The errors inherent in trying to compare the results of compression-deflection tests on cellular rubber samples of different sizes and thicknesses are pointed out in this issue of the *Newsletter*, by R. J. Noble, vice president, research and development. The causes of lack of uniformity in closed-cell rubber products are also discussed.

"Drain or Sampling Valve." Data Unit #294. Jerguson Gage & Valve Co., Somerville, Mass. 2 pages. Specifications and drawings of the company's self-draining valve No. 23 are contained in this data sheet.

"The Marblette Digest of Plastic Tooling." Marblette Corp., Long Island City, N. Y. 8 pages. This is an illustrated summary of existing applications of plastic tooling for metal-forming and plastics-forming and in foundry practice. Descriptions of the company's thermosetting materials, foam resin, and accessory materials for mold preparation and mold release are included.

DOW

"Locked in the Versene claw"—that's the fate of metal ions when they encounter chelation. They become trapped within the inner ring structure of a newly formed compound where they remain unless reverse action is desired. This phrase is taking on new meaning for the rubber industry as the chemistry of chelation is reviewed.

The Chemistry of Chelation: Part IV

Applications in the rubber industry · Prolonging polymerization Inhibiting action · In latexes · Rubber-coated fabrics · A new kind of chemistry?

As has been discussed previously, the Versene® series and Versenol® series chelating agents will inactivate practically all metal ions they contact in solution. The pH factor of the solution or of the finished product influences the choice of agent. To control iron in caustic solutions, look to Versene T®; in alkaline solutions—Versene Fe-3 Specific®; in acid—the Versene series. Or if solutions drift from one pH value to another, an effective Versene combination can be devised to completely complex metal ions present. However, when it is desirable, the claw-like holding power of chelation can be reversed. In polymerization reactions, for example, ferrous iron ions may be released gradually at a predetermined rate. This property is utilized in manufacturing synthetic rubber.

PROLONGING POLYMERIZATION

Erratic polymerization has been a costly bottleneck in the production of synthetic rubber. In the past, reactions would die out before desired conversion took place. Uniform viscosity of the polymer was difficult to maintain. Production delays and poor product uniformity frequently resulted. To correct these problems, pyrophosphates and hydroperoxides proved a step in the right direction . . . but still fell short of being satisfactory. Further study revealed that the final answer lay in organic chelating agents . . . that a reproducible Redox catalyst activation system can be obtained using Versene Fe-3 alone or with pyrophosphate.

A blend of ethylenediaminetetraacetic acid tetra sodium salt and N,N'-di-(2-hydroxyethyl) glycene sodium salt —Versene Fe-3 has proved adequate at less than 1/100 of a part per 100 parts of monomer charged. The complexing action of Versene Fe-3 locks large reservoirs of ferrous ions in solution and releases them gradually, allowing polymerization to continue at a controlled rate. Results: Production delays are reduced to a minimum; plant operations smooth out; product non-uniformities practically disappear.

INHIBITING ACTION

Research has shown chelation to be helpful in other areas of rubber manufacture—notably where copper and manganese cause an embrittlement problem. High costs and discoloring characteristics have been the drawbacks of commonly used inhibitors. But with Versene as the inhibitor, excellent results have been obtained. Versene holds the copper and manganese ions inactive and prevents discoloration from occurring.

IN LATEXES

In latexes, the use of Versene products as stabilizers prevents decomposition, coagulation, sludge formation, and putrefaction where such conditions are caused by metal ion contaminations. Inhibiting action lasts until the latex is coagulated or used for dipping. And if sludge is already precipitated, the Versene resuspends it by complexing the divalent metal compounds that caused the sludge in the first place.

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Difficulties arising in rubberizing fabrics are almost invariably due to traces of copper or manganese in the cloth. Enough contamination to cause trouble can result from passing the cloth over brass guide bars or by using equipment made of copper-bearing alloys.

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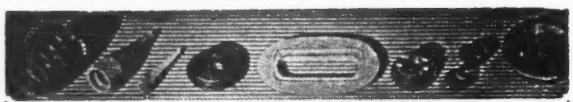

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Publications of the Office of Technical Services, United State Department of Commerce, Washington, D. C.:

"Theoretical Investigation of the Mechanisms of Transfer of Materials through Polyethylene." PB121194. H. A. Bent and J. Pinsky. 93 pages. Price, $2.50. The authors establish equations for permeability of polyethylene, along with master plots for interpolating homologous materials and extrapolating for temperature changes. A bibliography is included for permeability, solubility, and diffusion in polymer systems.

"The Theory of Plastic Plates." PB111943. W. Prager. 24 pages. Price, 75¢. Problems concerning circular plastic plates under rotationally symmetric conditions of loading and support are discussed in this publication. The report serves as an introduction to a number of recent, detailed papers and reports on the subject, some not readily accessible.

"A Review of the Air Force Materials Research and Development Program." PB 111648S. 137 pages. Price, $3.50. This is a collection of 205 abstracts of reports of research conducted under the Air Force's materials research and development program from July, 1954, to June, 1955. The research was in the fields of rubber, plastics, adhesives, textiles, petroleum products, metallurgy, analysis and measurement, protective treatments, packaging, and biochemistry.

"AEC Research Reports Price List." No. 26. This free price list of Atomic Energy Commission unclassified research reports for sale by OTS contains a cumulative listing of more than 3,000 AEC reports, including 1,034 items acquired since the beginning of the year.

Publications of the British Rubber Producers' Research Association, Welwyn Garden City, England:

No. 238. **"Hydroperoxide Yields of Autoxidized Olefins."** K. R. Hargrave and A. L. Morris. 10 pages. The hydroperoxide yields of 20 olefins, autoxidized under conditions where the kinetic chain length is of the order of 100, were measured, using a method based on stannous chloride as the reducing agent. Values in the range 42-100% were obtained, indicating that in certain cases the reaction mechanism which had been previously advanced for olefinic autoxidation requires modifications. These modifications are discussed.

No. 239. **"Associated Problems in Two-Dimensional Elasticity."** J. E. Adkins. 8 pages. The author here outlines a method for the simultaneous solution of two or more problems, with analytically similar boundary conditions, in two-dimensional elasticity. The procedure is illustrated by such examples as the circular ring and the infinite body containing a circular boundary.

No. 240. **"Synthesis of Di[ar-^{14}C]benzoyl Peroxide from [^{14}C] Benzene."** G. Ayrey and C. G. Moore. 4 pages. Recent studies in the BRPA laboratories of the polymerization of vinylic monomers in the presence of natural rubber have demonstrated the importance of the initiating catalyst on the reaction: namely, benzoyl peroxide leads to extensive rubber-polymer interaction (grafting), but azoisobutyronitrile, while initiating polymerization, does not cause significant interaction. A mechanistic study of the grafting process is being undertaken at the laboratories using [^{14}C]-labeled initiators, and this paper by Ayrey and Moore describes the synthesis of di[ar-^{14}C]benzoyl peroxide from [^{14}C]benzene.

No. 241. **"Finite Plane Deformation of Thin Elastic Sheets Reinforced with Inextensible Cords."** J. E. Adkins. 26 pages. This paper formulates a general theory, in tensor notation, for the finite elastic deformation of curvilinearly aeolotropic materials subject to constraints; the aeolotropy and the system of constraints are related to different curvilinear frames of reference in the undeformed body. The results obtained are utilized in considering the general two-dimensional deformation of a thin, plane, uniform sheet of elastic material, reinforced by means of a continuous layer of thin, flexible, inextensible cords lying in the plane midway between its major surfaces. The general theories for both two sets of cords and a single set of cords are developed.

"Why D-C?" General Electric Co., direct current motor and generator department, Erie, Pa. 32 pages. The advantages of a direct current drive in automated machinery and its specific use in the rubber, plastics, and other industries are described in this illustrated, hard-cover book. Conversion from alternating current to direct current through use of the company's equipment is also discussed.

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MARKET REVIEWS

Natural Rubber

Extreme caution and gradually softening prices characterized the natural rubber market during the period from August 16 to September 15, with the Suez situation still the dominant influence over both buying and prices. In general, market prices responded to the subtle changes in the probability of solution of the crisis, rising when the situation became worse, falling when the tension eased. Purchasers adopted a wait-and-see attitude. As a result, trading on the New York Commodity Exchange in all three contracts totaled only 30,080 tons.

Also influencing falling prices was the weight of physical rubber available. Supplies have been accumulating recently, particularly in Malaya, and there has been no compensating off-take, even in the lower grades of RSS, which today represent the bulk of the turnover in that market. The heavy position of the lower grades has been aggravated by up-country selling of supplies held back in the Federation in order to reap the benefit of a reduction in the replating cess from 4½ cents to 2 cents (Singapore) per pound, effective September 1.

Week-end closing Commodity Exchange future prices for all rubber contracts were:

R.S.S. #1 Contract

	Aug. 17	Aug. 24	Aug. 31	Sept. 7	Sept. 14
Sept.	36.65	37.85	33.90	38.80	33.70
Dec.	34.50	35.60	33.70	33.00	33.75
Total weekly sales, tons	3,670	2,540	3,210	2,910	3,450

Rubber-Standard Contract

	Aug. 17	Aug. 24	Aug. 31	Sept. 7	Sept. 14
Sept.	34.50	35.35	32.75	32.30	32.20
Dec. 1957	33.00	34.00	31.70	32.10	32.90
Mar.	31.55	32.35	31.30	31.40	32.00
May	30.55	31.35	30.40	30.70	31.55
July	29.55	30.35	29.45	29.70	30.75
Sept.	28.55	29.35	28.45	28.70	29.95
Total weekly sales, tons	560	190	280	840	1,300

Rex Contract

	Aug. 17	Aug. 24	Aug. 31	Sept. 7	Sept. 14
Sept.	35.00	35.75	33.50	32.55	33.35
Nov. 1957	33.55	34.25	32.95	32.65	33.05
Jan.	32.90	33.50	32.05	32.00	32.65
Mar.	32.00	32.50	31.40	31.60	32.10
May	31.00	31.60	30.60	31.00	31.70
July	30.10	30.70	29.70	30.00	30.90
Sept.	29.20	29.80	28.80	29.30	30.20
Total weekly sales, tons	2,600	2,190	3,550	2,240	5,540

On the physical market, RSS #1 began the August 16-September 15 period at 35.50¢ a pound, moved to a period-high of 35.75¢ the next two days, slid to a period-low of 32.88¢ on September 4, and ended the period at 33.50¢. Average August monthly spot prices for representative grades were as follows: RSS #1, 35.71¢; RSS #3, 34.20¢; #3 Amber Blankets, 29.92¢; and Flat Bark, 21.93¢ a pound. For the first half of September, the #1 grade averaged 33.13¢.

New York Spot Market
Week-End Closing Prices

	Aug. 17	Aug. 24	Aug. 31	Sept. 7	Sept. 14
RSS #1	35.75	35.38	33.88	33.25	33.50
2	35.25	34.84	33.38	32.88	33.13
3	34.75	34.38	33.13	32.38	32.13
Latex Crepe #1 Thick	46.50	46.38	44.88	43.88	44.38
Thin	46.50	46.38	44.88	43.88	44.38
#3 Amber Blankets	30.25	30.00	28.50	23.75	27.63
Thin Brown Crepe	29.75	29.50	28.00	27.25	27.13
Flat Bark	23.25	22.88	21.88	21.38	21.75

Synthetic Rubber

Reports from synthetic producers indicate that sales during September were somewhat above the levels of the preceding two months. This is traditional for the beginning of the fall season when vacation shutdowns and slowdowns have come to an end, and the automotive industry makes heavy purchases as a preliminary to the introduction of new car models.

August consumption of all types of synthetic rubber, including latices, is estimated by The Rubber Manufacturers Association, Inc., to have been 71,591 long tons, a substantial increase over the 57,338 long tons consumed in July. August SBR consumption is put at 58,947 long tons; neoprene, 6,555 long tons; butyl, 4,006 long tons; and N-types, 2,083 long tons. Corresponding July figures were 48,377, 4,314, 3,249, and 1,398. On the other hand, August production was down to 86,451 long tons from the 88,031 long tons turned out in July. SBR dropped from 70,483 to 69,539 long tons; neoprene from 7,935 to 7,769 long tons; butyl from 7,181 to 7,052 long tons; and N-types from 2,432 long tons to 2,091 long tons.

On a quarterly basis, industry sources indicate that higher September sales of synthetic rubber will not offset the summer doldrums, and the third quarter of 1956 is expected to be the low period of the year in terms of demand. A higher sales level is anticipated for the fourth quarter, with about 370,000 long tons of new rubber, both natural and synthetic, being consumed —about equal to consumption during the first and second quarters. It is believed that the percentage of SBR used during the fourth quarter will be maintained at the same level as was maintained during the first two quarters.

A tight butadiene situation is expected to characterize the fourth quarter of the year, despite its lower use during the third quarter. Announced expansion plans by butadiene producers, however, will undoubtedly ease pressures by the first quarter of 1957 unless there are attempts to build large inventories of the material.

Neoprene is now plentiful. Du Pont began production at its new Montague, Mich., plant early this month.

There are no indications that price changes in SBR or in new grades will take place in the immediate future.

Latex

Reports indicate that, with vacations over, there was a revival of buying interest in both natural and synthetic latices during the August 16-September 15 period. It was expected that the next period would see even greater improvement in the situation.

Prices for ASTM Centrifuged Concentrated natural latex, in tank-car quantities, f.o.b. rail tank cars, ranged during the period under consideration from 40 to 43¢ per pound solids. Prices of synthetic latices remained the same, being quoted as SBR, 26-32.3¢; neoprene, 37-47¢; and N-type, 46-54¢ a pound.

Final June and preliminary July domestic statistics for all latices were reported by the United States Department of Commerce as follows:

(All Figures in Long Tons, Dry Weight)

Type of Latex	Production	Imports	Consumption	Month-End Stocks
Natural				
June	0	5,006	5,171	21,033
July	0		4,512	19,560
SBR				
June	4,748	28	4,350	7,447
July	4,196		3,517	7,284
Neoprene				
June	907	0	637	1,328
July	444	0	558	1,054
Nitrile				
June	543	0	657	2,086
July	731	0	298	1,464

Reclaimed Rubber

Activity on the reclaimed rubber market during the August 16 September 15 period was reported to have been slow, although the first half of September gave signs of an immediate pickup. The changeover in the automotive industry is expected to make for vastly improved conditions.

According to the Bureau of the Census, United States Department of Commerce, exports of reclaimed rubber rose in May to 2,906,204 pounds, valued at $285,982, from the 2,642,004 pounds, worth $241,-

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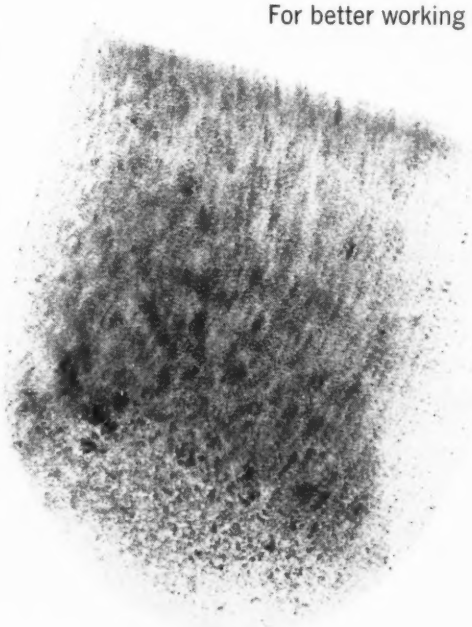

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964, exported in April. Biggest receiver by far during May was Canada, with 2,470,702 pounds. Columbia took 99,000 pounds; Mexico, 86,025 pounds; Venezuela, 69,000 pounds; Israel, 56,000 pounds; and the Netherlands, 30,000 pounds.

Prices were unchanged.

RECLAIMED RUBBER PRICES

	Lb.
Whole tire: first line	$0.105
Fourth line	.0925
Inner tube: black	.15
Red	.21
Butyl	.14
Pure gum, light colored	.23
Mechanical, light colored	.135

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

Scrap Rubber

Business in the scrap rubber market during the August 16-September 15 period was moderate. Some pickup was anticipated as the vacation period, and other holidays, were at an end. Further on, reclaimer consumption of scrap was expected to increase in the approaching cold-weather months.

Imports of scrap rubber during May showed an increase of 272,101 pounds from arrivals in the preceding month, according to the Bureau of the Census, United States Department of Commerce. May receipts came to 2,132,460 pounds, valued at $108,638, compared with 1,860,359 pounds, worth $89,143 in April. For the first five months of this years scrap rubber imports totaled 11,614,438 pounds, valued at $609,023.

Canada was the chief shipper of scrap rubber to the United States in May, with 1,179,962 pounds, or more than half of the month's arrivals. The United Kingdom supplied 322,075 pounds; West Germany, 299,191 pounds; France, 114,932 pounds; and Ceylon, 33,600 pounds. Imports from other countries of less than $10,000 from each destination totaled 182,700 pounds, valued at $8,886.

During the period, No. 3 peelings suffered a price decline of $2 a ton at Akron, while holding steady at eastern points. Mixed auto tires dropped fractionally. On the other hand, mixed and black auto tubes rose in price fractionally. Other prices held.

Period-end buying prices for scrap rubber grades were as follows:

	Eastern Points	Akron, O.
	(Per Net Ton)	
Mixed auto tires	$11.00/13.50	$13.50
S.A.G. auto tires	Nom.	Nom.
Truck tires	Nom.	Nom.
Peelings, No. 1	40.00	40.00
2	Nom.	Nom.
3	16.00	17.00
Tire buffing	Nom.	Nom.
	(¢ per Lb.)	
Auto tubes, mixed	2.50	2.50
Black	5.50	5.50
Butyl	3.00	3.00
Red	6.50	6.75

Cotton Fabrics

With sales of wide drills practically at a standstill early in the August 16-September 15 period, production was cut back severely in order to prevent excessive inventory buildups at the mill level. Later, sales of wide drills showed some sign of improvement, and cautious production began again. By period-end, renewed confidence and a more optimistic outlook were evident in the wide industrial fabrics market, reflecting in part a general reduction in stocks of staple goods and a reviving interest on the part of coaters, auto producers, and other users of these goods.

Good calls and continuing interest were shown during the period by coaters and auto producers in the new wide osnaburg cloth, according to trade sources. The automotive field generally seemed to be coming more and more into the industrial fabrics picture.

Period-end prices of cotton fabrics follow:

COTTON FABRICS

Drills		
59-inch 1.85 yd.	yd.	$0.36
2.25-yd.		.315
Ducks		
38-inch 1.78-yd. S.F.	yd.	nom.
2.00-yd. D.F.		nom.
51.5-inch, 1.35-yd. S.F.		.4963
Hose and belting		.69
Osnaburgs		
40-inch 2.11-yd.	yd.	.25
3.65-yd		.16
Raincoat Fabrics		
Printcloth, 38½-in., 64x60, 5.35-yd.	yd.	.1375
6.25 yd.		.12
Sheeting, 48-inch, 4.17-yd.		.20
52-inch, 3.85-yd.		.2325
Chafer Fabrics		
14.40-oz./sq. yd. Pl.	yd.	.70
11.65-oz./sq. yd. S.		.61
10.80-oz./sq. yd. S.		.6575
8.9-oz./sq. yd. S.		.67
Other Fabrics		
Headlining, 59-in., 1.65-yd., 2-ply	yd.	.41
64-inch, 1.25-yd., 2-ply		.59
Sateens, 53-inch, 1.32-yd.		.5575
58-inch, 1.21-yd.		.61
Tire Cord		
1242 Standard	lb.	.83

Rayon

Total calculated production of rayon and acetate yarn during August was 56,500,000 pounds, of which 28,100,000 pounds were regular-tenacity yarn and 28,400,000 pounds were high-tenacity rayon yarn. July production had been: total, 56,600,000 pounds; regular-tenacity, 27,700,000 pounds; and high-tenacity, 28,900,000 pounds.

Domestic shipments for August totaled 55,800,000 pounds, consisting of 27,900,000 pounds of regular-tenacity yarn and 27,900,000 pounds of high-tenacity rayon yarn. July shipments had been: total, 52,000,000 pounds; regular-tenacity, 24,300,000 pounds; and high-tenacity, 27,700,000 pounds.

Total end-of-August stocks were 67,000,000 pounds, of which 52,100,000 pounds were regular-tenacity yarn and 14,900,000 pounds were high-tenacity rayon yarn. End-of-July stocks had been: total, 67,500,000 pounds; regular-tenacity, 52,500,000 pounds; and high-tenacity, 15,000,000 pounds.

Current prices of tire yarns and fabrics, unchanged from last month, are as follows:

RAYON PRICES

Tire Yarns		
High-Tenacity		
1100/ 480	$0.62/	$0.67
1100/ 490	.62/	.67
1150/ 490		.67
1165/ 480		.68
1230/ 490		.67
1650/ 720	.58/	.64
1650/ 980	.58/	.64
1875/ 980		.64
2200/ 960	.58/	.63
2200/ 980	.58/	.63
2200/1466		.67
4400/2934		.63
Super-High-Tenacity		
1650/ 720	.63/	.69
1900/ 720		.69
Tire Fabrics		
1100/490/2		.77
1650/980/2		.725
2200/980/2		.715

Fourth Du Pont Nylon Plant

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., will build its fourth nylon plant in Richmond, Va. The multi-million-dollar structure will have a production capacity of 40 million pounds of fiber annually. Completion is expected by the end of 1957.

The plant will be built on the site of the company's rayon plant in an effort to "stabilize employment in the face of a lessened demand for rayon." This will be a departure from Du Pont's traditional practice of having only a single fiber produced at any one of its eight fiber-producing locations.

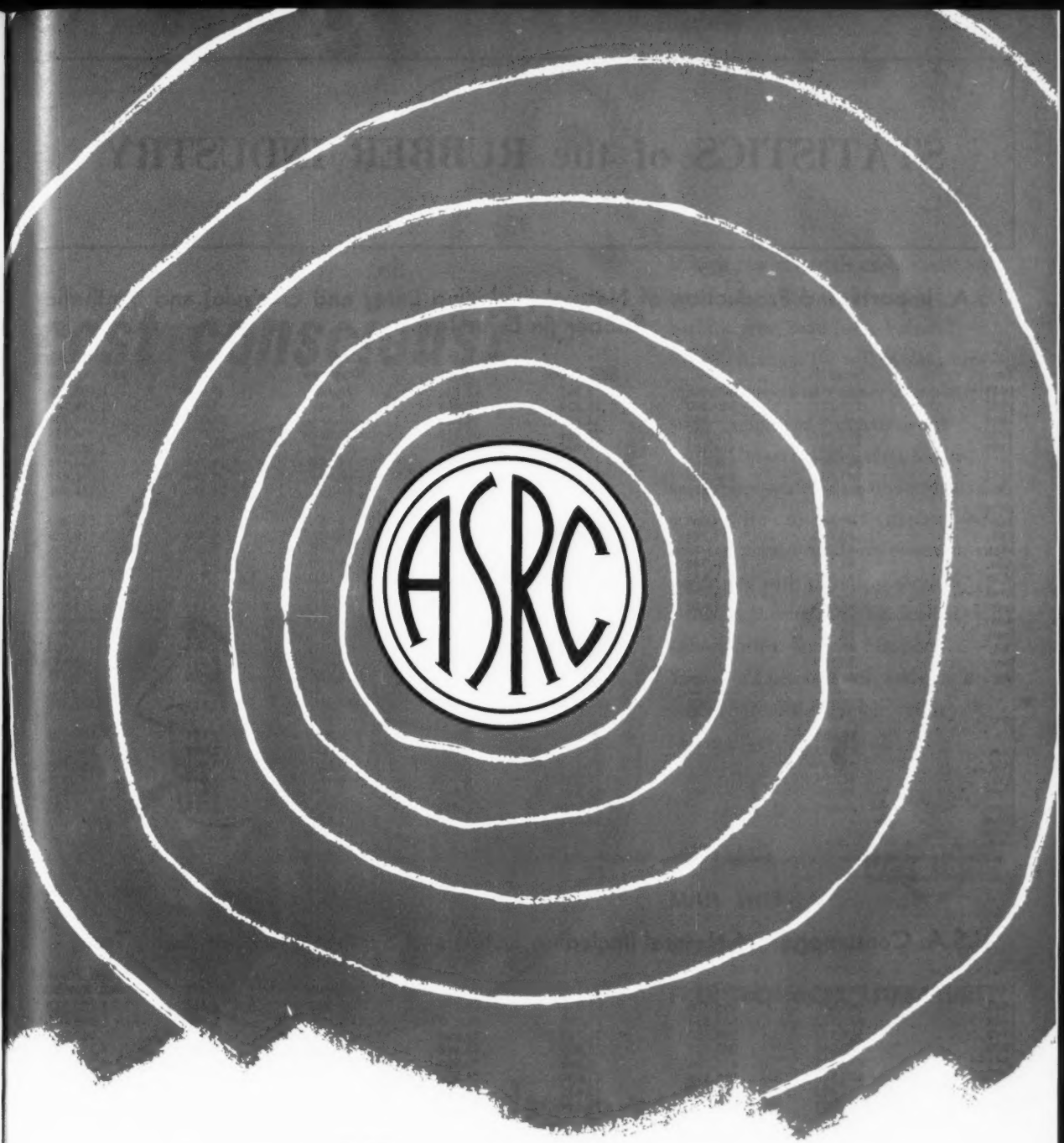
The new plant will produce heavy denier, high-tenacity nylon yarn, most of which goes into tire cord manufacture. The company also makes the high-tenacity yarn at its Seaford, Del., and Chattanooga, Tenn., plants.

Caprolan Line Increased

National Aniline Division, Allied Chemical & Dye Corp., New York, N. Y., has increased the number of its Caprolan nylon heavy yarns now in commercial production to 13, according to George H. Hotte, director of fiber sales and service.

The yarns were established on a commercial basis early this year and are said to have found acceptance in webbings, conveyor belt fabrics, tapes, and other products.

United States Rubber Co., New York, N. Y., has appointed Wm. Simpson Sons & Co., Inc., as sales agent for finished fabrics produced by the U. S. textile division for garment manufacturers and over-the-counter trades.



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Current Polymers

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ASRC 1500	Staining
ASRC 1502	Non-staining
Cold Oil	
ASRC 1703	Non-staining
ASRC 1708	Non-staining
Hot	
ASRC 1000	Staining
ASRC 1001	Slightly staining
ASRC 1004	Staining
ASRC 1006	Non-staining

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STATISTICS of the RUBBER INDUSTRY

U.S.A. Imports and Production of Natural (Including Latex and Guayule) and Synthetic Rubber (in Long Tons)

Year	Natural	GR-S	SBR-Types	Butyl	Neoprene	N-Type	Total Natural and Synthetic
1947	688,354	405,496	3,362	62,824	31,495	6,618	1,198,149
1948	735,227	390,240	15,252	56,662	34,848	7,012	1,239,241
1949	660,792	288,882	21,717	54,046	35,215	11,072	1,071,724
1950	802,249	350,801	28,086	60,915	50,067	12,037	1,304,155
1951	733,048	694,583	9,946	76,475	58,907	15,333	1,588,292
1952	805,997	636,969	17,885	81,630	65,745	16,228	1,624,454
1953	647,615	668,386	12,342	79,801	80,495	20,198	1,508,837
1954	596,848	472,698	17,707	58,802	69,150	21,396	1,236,601
1955							
Jan.	49,941	57,607	1,436	3,220	6,983	2,215	121,402
Feb.	50,880	55,293	1,149	3,727	6,910	1,659	119,618
Mar.	61,250	63,940	1,229	5,256	7,132	2,409	141,216
Apr.	61,113	50,745	10,081	5,148	8,359	2,433	137,879
May	61,042	3,592	63,220	5,115	7,852	2,720	143,541
June	52,762	3,739	61,717	3,872	5,919	3,422	131,431
July	43,626	1,640	64,910	5,395	6,904	3,195	125,670
Aug.	59,840	...	68,898	4,203	8,511	2,792	144,244
Sept.	50,459	...	68,228	5,097	7,677	2,821	134,282
Oct.	45,720	...	73,103	5,501	8,118	2,958	135,400
Nov.	50,509	...	75,745	4,935	8,537	2,931	142,657
Dec.	48,032	...	74,813	4,710	8,455	3,068	139,078
Total	635,174	236,556	564,589	56,179	91,357	32,623	1,616,478
1956							
Jan.	58,803	...	76,028	6,896	8,207	3,125	153,059
Feb.	53,353	...	73,457	6,229	8,560	2,989	144,588
Mar.	52,749	...	77,812	5,686	7,822	3,663	147,732
Apr.	51,394	...	74,502	5,685	8,481	3,648	143,710
May	39,789	...	78,309	5,647	7,795	2,903	134,443
June	36,694	...	69,820	4,638	8,929	2,350	122,431
July*			70,483	7,181	7,935		

* Preliminary.
Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.

U.S.A. Consumption of Natural (Including Latex) and Synthetic Rubber (Long Tons)

Year	Natural	GR-S	SBR-Types	Butyl	Neoprene	N-Type	Total Natural and Synthetic
1947	562,661	446,316	2,273	68,838	37,703	4,536	1,122,327
1948	627,332	334,233	11,080	58,870	32,118	5,771	1,069,404
1949	574,522	299,420	21,717	52,664	31,753	8,827	988,903
1950	720,268	388,427	27,803	66,348	43,781	11,930	1,258,557
1951	454,015	617,200	9,244	70,500	48,887	13,066	1,212,912
1952	453,846	648,816	17,604	71,229	55,522	13,866	1,260,883
1953	553,473	611,748	12,433	77,826	65,900	16,929	1,338,309
1954	596,285	483,001	17,344	61,464	57,203	17,715	1,233,412
1955							
Jan.	56,911	54,728	1,643	4,478	5,676	1,931	125,367
Feb.	50,997	54,707	1,293	4,312	5,476	1,921	118,706
Mar.	58,472	62,548	1,189	4,839	6,423	2,174	135,645
Apr.	52,963	54,091	5,655	4,321	5,884	2,172	125,086
May	54,746	2,533	60,325	4,455	6,143	1,965	130,167
June	56,282	3,666	62,226	4,704	6,320	2,581	135,779
July	46,166	2,690	50,398	3,894	4,294	1,621	109,063
Aug.	48,359	...	59,746	4,307	6,450	2,219	121,268
Sept.	50,963	...	63,330	4,578	6,197	2,270	127,338
Oct.	54,995	...	66,744	4,739	6,626	2,280	135,374
Nov.	52,769	...	68,111	4,420	6,896	2,234	134,430
Dec.	48,377	...	63,149	4,219	6,491	2,167	124,403
Yr.-end adj.	+2,800	...	+3,225	+725		+500	+7,250
Total	634,800	234,963	507,034	53,991	72,876	26,035	1,529,699
1956							
Jan.	53,751	...	65,375	4,223	6,684	2,198	132,231
Feb.	50,285	...	62,366	4,155	6,430	2,289	125,525
Mar.	50,040	...	64,458	4,515	6,542	2,373	127,928
Apr.	47,446	...	62,179	4,228	6,125	2,150	122,128
May	48342	...	63,629	4,285	6,379	2,103	124,738
June	43,638	...	56,390	4,026	5,536	1,864	111,454
July*	37,888	...	48,377	3,249	4,314	1,398	95,226

* Preliminary.
Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.

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U.S.A. Stocks of Synthetic Rubber

(Long Tons)

Year	SBR-Types	Butyl	Neoprene	N-Type	Total
1944	122,412	9,992	12,262	5,366	150,032
1945	170,571	18,378	9,703	4,802	203,454
1946	83,090	19,478	10,470	3,755	116,793
1947	40,606	13,184	5,237	3,339	62,366
1948	96,304	10,995	5,072	2,762	115,133
1949	77,743	12,224	4,654	3,433	98,054
1950	36,942	7,243	5,733	2,840	52,758
1951	105,271	12,481	8,379	3,821	129,952
1952	83,861	22,716	8,535	3,875	118,987
1953	135,153	24,866	11,480	4,346	175,845
1954	115,499	19,267	11,349	4,280	150,395
1955					
Jan.	114,976	17,079	11,598	4,121	147,774
Feb.	111,796	15,424	10,555	3,888	141,663
Mar.	113,594	15,096	11,037	3,860	143,587
Apr.	112,156	14,813	10,863	3,612	141,444
May	109,381	14,449	10,283	3,995	138,108
June	103,844	13,053	9,755	4,042	130,694
July	110,281	13,288	11,213	5,120	139,902
Aug.	108,211	12,395	11,326	5,118	137,050
Sept.	107,641	12,190	11,209	4,995	136,035
Oct.	105,746	12,146	11,820	5,041	134,753
Nov.	105,287	11,646	11,530	5,201	133,664
Dec.	108,339	10,180	12,220	5,580	136,319
Yr.-end adj.	+650	+320	.....	+450	+1,420
	108,989	10,500	12,220	6,030	137,739
1956					
Jan.	111,263	12,303	11,850	6,316	141,732
Feb.	114,389	13,027	11,888	6,602	145,906
Mar.	118,063	13,458	12,037	7,437	150,995
Apr.	121,054	14,071	12,042	8,243	155,370
May	127,163	15,253	11,478	8,788	162,682
June	133,570	15,744	12,927	8,955	171,196
July*	144,782	18,416	14,999	9,240	187,437

Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.
* Preliminary.

U.S.A. Stocks of Latex

(Long Tons, Dry Weight)

Year	Natural	GR-S*	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1944	2,443	....	....	....		2,443
1945	3,121	....	....	....		3,121
1946	4,865	....	....	....		4,865
1947	5,033	....	....	....		5,033
1948	11,235	....	....	....		11,235
1949	5,063	....	....	....		5,063
1950	4,927	....	....	....		4,927
1951	4,752	3,727	1,245	532	5,504	10,256
1952	6,201	5,040	1,019	902	6,961	13,162
1953	13,532	4,794	1,117	721	6,632	20,164
1954	11,133	5,134	1,087	811	7,032	18,165
1955						
Jan.	9,684	5,861	1,067	812	7,740	17,424
Feb.	8,619	5,753	879	692	7,324	15,943
Mar.	7,820	6,940	909	658	8,507	16,327
Apr.	6,790	7,098	786	725	8,609	15,399
May	8,854	7,021	767	842	8,630	17,484
June	9,788	6,645	817	958	8,420	18,208
July	11,934	6,950	850	1,155	8,955	20,889
Aug.	11,962	6,201	885	1,076	8,162	20,124
Sept.	12,595	6,448	975	1,296	8,719	21,314
Oct.	12,156	5,798	1,075	1,196	8,069	20,225
Nov.	12,616	6,307	1,089	1,174	8,570	21,186
Dec.	12,628	6,480	1,236	1,282	8,998	21,626
Yr.-end adj.	+575	+500	....	+525	+1,025	−1,600
	13,203	6,980	1,236	1,807	10,023	23,226
1956						
Jan.	16,059	6,522	1,093	1,906	9,521	25,580
Feb.	16,735	7,011	1,162	1,943	10,116	26,851
Mar.	18,309	6,867	1,097	2,340	10,304	28,613
Apr.	21,384	7,415	1,163	2,272	10,850	32,234
May	21,234	7,516	1,218	2,194	10,928	32,162
June	21,033	7,447	1,328	2,086	10,861	31,894
July†	19,560	7,284	1,054	1,464	9,802	29,362

Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.
* Includes SBR-Types.
† Preliminary.

U.S.A. Imports and Production of Natural and Synthetic Latices

(Long Tons, Dry Weight)

Year	Natural	GR-S*	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1944	3,090	6,580	4,683	....	11,263	14,353
1945	4,768	15,176	7,077	....	22,253	27,021
1946	8,012	24,810	13,595	....	38,405	46,417
1947	17,675	22,474	6,089	....	28,563	46,238
1948	32,630	21,494	5,022	....	26,516	59,146
1949	29,974	21,357	3,651	....	25,008	54,982
1950	54,401	31,339	5,725	....	37,064	91,465
1951	54,963	32,972	6,866	2,948	42,786	97,749
1952	48,228	42,273	7,598	4,164	54,035	102,263
1953	75,511	48,112	9,026	5,844	62,982	138,493
1954	74,483	48,379	8,214	6,866	63,459	137,942
1955						
Jan.	7,853	6,199	617	708	7,524	15,377
Feb.	6,110	5,634	797	525	6,956	13,066
Mar.	7,611	7,078	854	738	8,670	16,281
Apr.	8,550	5,680	975	972	7,627	16,177
May	8,849	5,337	880	815	7,032	15,881
June	7,736	4,777	905	1,450	7,132	14,868
July	8,702	4,800	641	951	6,392	15,094
Aug.	8,885	4,519	881	1,010	6,410	15,295
Sept.	8,109	5,769	994	1,091	7,854	15,963
Oct.	6,900	6,231	922	883	8,036	14,936
Nov.	7,085	6,933	1,004	781	8,718	15,803
Dec.	6,364	6,407	962	874	8,243	14,607
Total	92,754	69,364	10,432	10,798	90,594	183,348
1956						
Jan.	10,328	6,885	848	919	8,652	18,980
Feb.	7,671	6,943	930	827	8,700	16,371
Mar.	7,800	5,911	782	1,158	7,851	15,651
Apr.	6,995	6,097	969	866	7,922	14,917
May	5,731	4,966	939	614	6,519	12,250
June	5,006	4,776	907	543	6,226	11,232
July†	.....	....	444	731	.....	.....

Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.
* Includes SBR-Types.
† Preliminary.

U.S.A. New Supply, Consumption, Exports, and Stock of Reclaimed Rubber

(Long Tons)

Year	New Supply	Consumption	Exports	Stocks
1944	260,631	251,083	11,800	43,832
1945	243,309	241,036	13,413	28,155
1946	295,612	275,410	14,461	33,666
1947	291,395	288,395	14,556	35,943
1948	266,861	261,113	11,428	32,630
1949	224,029	222,679	10,367	28,263
1950	314,008	303,733	11,740	35,708
1951	366,700	346,121	14,722	45,082
1952	274,981	280,002	11,180	30,664
1953	298,336	285,050	11,397	32,319
1954	258,101	249,049	10,232	30,746
1955				
Jan.	25,336	25,322	1,041	29,656
Feb.	25,444	24,333	1,085	30,125
Mar.	29,574	28,674	1,088	30,311
Apr.	26,817	26,609	1,088	30,068
May	27,911	27,652	1,056	29,528
June	30,451	29,157	1,128	29,725
July	24,114	22,563	1,176	29,939
Aug.	25,223	25,790	1,144	27,956
Sept.	26,512	26,340	1,018	27,110
Oct.	28,038	26,597	1,381	27,565
Nov.	29,124	27,229	1,313	28,473
Dec.	28,105	24,515	1,470	31,058
Year.-end adj.	.....	−2,000		+440
Total	326,649	312,781	13,988	31,498
1956				
Jan.	26,205	25,827	1,382	31,640
Feb.	27,108	25,571	1,115	31,875
Mar.	28,468	26,176	1,163	33,326
Apr.	26,933	23,999	1,179	34,360
May	25,485	23,560	1,297	34,863
June	22,153	20,560	1,264	35,647
July*	19,428	18,011	...	35,431

Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.
* Preliminary.

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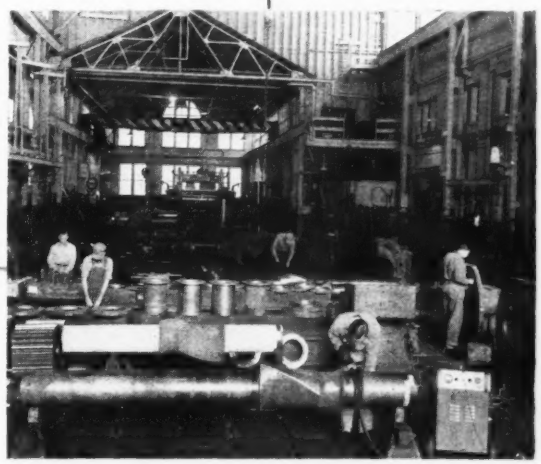

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RUBBER MACHINERY DIVISION
TELEPHONE ERIE 2-3661

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U.S.A. Exports of Synthetic Rubber

(Long Tons)

Year	SBR-Types	Butyl	Neoprene	N-Type	Total
1953	7,692	237	11,494	3,245	22,668
1954	11,069	2,831	12,062	4,155	30,117
1955					
Jan.	1,381	716	1,046	194	3,337
Feb.	1,331	370	1,049	259	3,009
Mar.	2,162	672	1,287	236	4,357
Apr.	1,807	1,562	1,636	506	5,511
May	3,500	376	1,430	357	5,663
June	6,030	726	1,541	389	8,686
July	5,212	870	1,275	472	7,829
Aug.	7,727	837	1,454	386	9,567
Sept.	8,598	526	1,946	602	11,672
Oct.	7,888	1,041	1,748	444	11,121
Nov.	7,786	894	1,824	306	10,810
Dec.	7,282	1,305	1,862	442	10,891
Total	60,704	9,895	18,098	4,593	93,290
1956					
Jan.	7,550	815	1,757	506	10,628
Feb.	9,018	1,624	1,521	449	12,612
Mar.	10,804	764	1,500	522	13,590
Apr.	10,271	374	1,917	587	13,149
May	10,864	743	2,142	443	14,192
June	9,310	746	2,088	548	12,692

Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.

U.S.A. Automotive Inner Tubes

(Thousands of Units)

	Shipments					
Year	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1953	37,957	36,072	878	74,907	74,425	11,874
1954	25,090	35,442	948	61,480	58,397	
1955						
Jan.	413	3,629	74	4,116	3,089	8,252
Feb.	352	2,430	80	2,862	2,850	8,243
Mar.	491	2,732	105	3,328	3,234	8,217
Apr.	530	2,635	85	3,250	2,836	7,963
May	531	2,617	85	3,233	3,005	7,735
June	477	3,003	85	3,565	3,136	7,326
July	475	2,915	60	3,450	2,768	6,664
Aug.	394	3,274	65	3,733	2,923	5,917
Sept.	360	2,814	86	3,261	3,169	5,966
Oct.	319	2,595	89	3,004	3,119	6,286
Nov.	355	2,427	93	2,875	3,052	6,734
Dec.	305	2,289	92	2,686	2,719	6,833
Total	5,002	33,360	999	39,363	35,900	
1956						
Jan.	274	3,263	72	3,608	2,918	6,294
Feb.	273	2,548	100	2,921	2,969	6,547
Mar.	282	2,587	93	2,962	3,347	6,848
Apr.	265	2,444	88	2,797	3,094	7,312
May	280	2,515	83	2,878	3,093	7,657
June	269	3,023	79	3,370	2,837	7,349
July	248	3,055	82	3,384	2,300	6,418

Source: The Rubber Manufacturers Association, Inc.

U.S.A. Rubber Industry Sales and Inventories

(Million of Dollars)

	Value of Sales*				Manufacturers' Inventories*			
	1953	1954	1955	1956	1953	1954	1955	1956
Jan.	424	348	424	415	866	844	790	935
Feb.	435	351	440	445	868	857	782	970
Mar.	473	388	466	451	880	849	805	979
Apr.	444	375	445	445	874	812	784	970
May	422	357	465	464	888	810	810	985
June	436	377	465		914	829	850	
July	448	374	471		925	784	853	
Aug.	409	337	456		897	761	863	
Sept.	416	334	456		908	804	874	
Oct.	395	332	447		881	838	902	
Nov.	346	388	482		867	819	935	
Dec.	369	407	465		868	929	934	
Total	5,017	4,368	5,493		Av. 853	831	845	

Source: Office of Business Economics, U. S. Department of Commerce.
* Adjusted for seasonal variation.

U.S.A. Consumption of Natural and Synthetic Latices

(Long Tons, Dry Weight)

Year	Natural	GR-S*	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1953	67,375	46,473	7,981	3,654	58,108	125,483
1954	75,931	44,173	7,251	4,507	55,931	131,862
1955						
Jan.	7,355	4,537	661	509	5,707	13,062
Feb.	7,066	4,881	689	505	6,075	13,141
Mar.	8,415	5,861	828	512	7,201	15,616
Apr.	7,732	5,209	748	606	6,563	14,295
May	6,643	4,278	768	496	5,542	12,185
June	6,589	4,885	722	591	6,198	12,787
July	5,469	3,830	535	430	4,795	10,264
Aug.	6,784	4,514	770	547	5,831	12,615
Sept.	7,452	5,505	730	595	6,830	14,282
Oct.	7,209	5,704	739	614	7,057	14,266
Nov.	6,620	5,954	829	603	7,386	14,006
Dec.	6,344	5,599	717	587	6,903	13,247
Yr.-end adj.	+2,800	+2,775	...	+1,900	+4,675	+7,475
Total	86,478	63,982	8,736	8,495	81,213	167,691
1956						
Jan.	6,776	5,858	772	670	7,300	14,076
Feb.	6,399	5,913	787	730	7,430	13,829
Mar.	6,438	5,888	729	781	7,398	13,836
Apr.	5,693	4,923	741	692	6,356	12,049
May	5,239	4,745	778	691	6,214	11,453
June	5,171	4,350	637	657	5,644	10,815
July†	4,512	3,517	558	298	4,373	8,885

Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.
† Preliminary. * Includes SBR-Types.

U.S.A. Synthetic Rubber Industry, Wages, Hours

Year	Average Weekly Earnings	Average Weekly Hours	Average Hourly Earnings
1954	$90.76	40.7	$2.23
1955			
Jan.	93.02	40.8	2.28
Feb.	93.07	41.0	2.27
Mar.	94.12	41.1	2.29
Apr.	99.53	42.9	2.32
May	95.22	41.4	2.30
June	96.51	41.6	2.32
July	97.53	41.5	2.35
Aug.	99.96	42.0	2.38
Sept.	100.08	41.7	2.40
Oct.	98.83	41.7	2.37
Nov.	100.14	41.9	2.39
Dec.	100.98	41.9	2.41
1956			
Jan.	101.88	42.1	2.42
Feb.	101.57	41.8	2.43
Mar.	102.51	41.5	2.47
Apr.	102.75	41.6	2.47
May	103.00	41.2	2.50

Source: BLS, United States Department of Labor.

U.S.A. Rubber Consumption by Main Products

(1,000 Long Tons)

	Transportation			Non-Transportation			
Year	Natural	Synthetic	Total	Natural	Synthetic	Total	Grand Total
1951	308.6	502.7	811.3	145.4	256.2	401.6	1,212.9
1952	303.2	539.4	842.6	150.6	267.7	418.3	1,260.9
1953	358.2	500.3	858.5	195.2	284.6	479.8	1,338.3
1954	386.3	391.0	777.3	210.0	245.7	455.7	1,233.0
1955	409.6	550.3	959.9	225.2	344.6	569.8	1,529.7
1956							
1st quart.	100.7	138.3	239.0	53.3	93.3	146.6	385.6

Source: Secretariat of the International Rubber Study Group.

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World Production of Natural Rubber

(1,000 Long Tons)

Year	Malaya		Indonesia		All Other	Total
	Estate	Native	Estate	Native		
1947	360.5	285.8	12.8	265.2	335.7	1,260.0
1948	403.6	294.6	101.7	330.6	394.5	1,525.0
1949	400.8	270.7	169.1	263.9	385.5	1,490.0
1950	376.7	317.4	175.1	521.4	469.4	1,860.0
1951	328.8	276.5	222.5	591.9	465.3	1,885.0
1952	341.7	242.5	293.2	456.0	456.6	1,790.0
1953	341.8	232.6	301.8	390.4	458.4	1,725.0
1954	343.5	240.8	280.5	464.3	473.4	1,802.5
1955						
Jan.	29.3	27.9	23.6	17.1	42.1	140.0
Feb.	28.5	20.4	22.3	48.1	38.2	157.5
Mar	27.5	26.7	23.0	23.8	39.0	140.0
Apr.	24.2	20.5	20.7	27.4	42.2	135.0
May	27.4	22.4	18.0	30.1	37.1	135.0
June	27.6	22.9	21.3	52.7	40.5	165.0
July	30.3	25.7	21.2	32.5	55.3	165.0
Aug.	30.7	23.6	20.0	43.2	37.5	155.0
Sept.	31.3	24.9	20.3	45.2	45.8	167.5
Oct.	30.8	24.0	22.0	44.8	48.4	170.0
Nov.	30.3	21.9	23.4	37.3	44.6	157.5
Dec.	35.0	27.3	24.5	70.2	50.5	207.5
Total	352.9	286.2	261.3	472.4	521.2	1,895.0
1956						
Jan.	32.6	26.5	23.5	17.4	42.5	142.5
Feb.	27.6	24.3	23.0	20.9	36.7	132.5
Mar.	28.5	22.5	21.5	16.4	41.1	130.0
Apr.	26.7	21.7	20.0	46.1	40.4	155.0
May	23.5	19.8	18.0	38.4	37.8	137.5
June	29.5	23.2	21.9	25.9	44.5	145.0

Source: BDSA, United States Department of Commerce; Secretariat of the International Rubber Study Group; and United Baltic Corp., Ltd.

World Consumption of Natural Rubber

(1,000 Long Tons)

Year	United States	U.S.S.R.* and China	United Kingdom	Other Foreign	Total Foreign	Grand* Total
1947	562.7	57.2	153.6	336.5	547.3	1,100.0
1948	627.3	121.0	193.7	480.5	795.2	1,422.5
1949	574.5	132.5	184.3	546.2	863.0	1,437.5
1950	720.3	152.5	219.7	612.5	984.7	1,705.0
1951	454.0	136.3	234.2	675.5	1,046.0	1,500.0
1952	453.8	146.8	197.3	652.1	996.2	1,450.0
1953	553.5	101.9	206.6	753.0	1,061.5	1,615.0
1954						
Jan.	47.0	7.8	20.3	67.4	95.5	142.5
Feb.	46.9		17.5	70.6	88.1	135.0
Mar.	53.7	2.7	19.1	72.0	93.8	147.5
Apr.	51.4	15.5	19.7	68.4	103.6	155.0
May	51.4	1.1	18.8	66.2	86.1	137.5
June	54.2	3.6	18.0	64.1	85.7	140.0
July	37.9	0.8	17.7	68.6	87.1	125.0
Aug.	38.1	8.9	14.2	63.8	86.9	125.0
Sept.	52.4	11.5	19.3	71.8	102.6	155.0
Oct.	56.0	3.5	23.1	74.9	101.5	157.5
Nov.	53.3	2.3	19.2	75.2	96.7	150.0
Dec.	55.2	5.0	19.6	72.7	97.3	152.5
Total	597.5	62.7	226.5	835.7	1,124.9	1,725.0
1955						
Jan.	56.9	7.8	23.5	71.8	103.1	160.0
Feb.	51.0		20.1		89.0	140.0
Mar.	58.5	7.3	21.4	72.8	101.5	160.0
Apr.	53.0		23.3		104.5	157.5
May	54.7		20.5		97.8	152.5
June	56.3	2.8	18.3	80.1	101.2	157.5
July	46.2	1.8	18.3	73.7	93.8	140.0
Aug.	48.4	0.1	16.0	65.5	81.6	130.0
Sept.	51.0	2.1	19.8	72.1	94.0	145.0
Oct.	55.0	10.4	22.9	76.7	110.0	165.0
Nov.	52.8	17.1	20.0	77.6	114.7	167.5
Dec.	51.2	5.2	22.2	83.9	111.3	162.5
Total	634.8	56.2	246.3	900.2	1,202.7	1,837.5
1956						
Jan.	53.4	14.4	21.7	73.0	109.1	162.5
Feb.	50.1	19.1	17.9	72.9	109.9	160.0
Mar.	49.6	11.7	16.0	73.7	100.4	150.0
Apr.	47.0	14.6	18.4	72.5	105.5	152.5
May	48.3	16.8	14.5	75.4	106.7	155.0
June	42.9	20.8	16.1	75.2	112.1	155.0

Source: BDSA, United States Department of Commerce; Secretariat of the International Rubber Study Group; and United Baltic Corp., Ltd.
* Estimated.

World Production of Synthetic Rubber

(1,000 Long Tons)

Year	U.S.A.	Canada	Germany	Total
1953	848.4	80.9	6.3	935.6
1954	622.9	86.6	6.9	716.4
1955				
Jan.	69.9	8.1	0.9	78.9
Feb.	67.7	7.6	0.9	76.2
Mar.	78.5	8.7	0.8	88.0
Apr.	75.7	7.6	0.8	84.1
May	82.0	8.9	0.9	91.7
June	78.2	8.6	0.9	87.7
July	81.9	8.2	0.9	91.0
Aug.	84.0	8.1	1.0	93.1
Sept.	83.5	9.3	0.9	93.7
Oct.	89.1	9.9	1.0	100.0
Nov.	91.3	9.2	1.0	101.5
Dec.	90.3	9.7	1.0	101.0
Total	970.5	103.9	10.9	1,085.3
1956				
Jan.	93.5	9.7	1.0	104.3
Feb.	90.5	8.2	1.0	99.7
Mar.	94.4	10.3	1.1	105.8
Apr.	91.6	10.3	1.0	102.8
May	93.7	10.6	1.0	105.3
June	85.2	10.4	...	....

Source: Secretariat of the International Rubber Study Group; and BDSA United States Department of Commerce.

World Consumption of Synthetic Rubber*

(1,000 Long Tons)

Year	U.S.A.	Canada	United Kingdom	Total† Continent of Europe	World† Grand Total
1953	784.8	35.9	4.9	39.3	872.5
1954	636.7	30.1	8.7	50.8	740.0
1955					
Jan.	68.4	2.6	1.2	5.8	80.0
Feb.	67.6	3.1	1.1	5.5	77.5
Mar.	77.1	3.4	1.2	6.0	90.0
Apr.	72.1	3.0	1.5	5.8	85.0
May	75.7	3.3	1.4	6.0	87.5
June	80.2	3.8	1.5	6.5	92.5
July	63.3	2.7	1.4	6.3	75.0
Aug.	73.3	2.7	1.5	6.3	87.5
Sept.	76.7	3.7	1.9	7.0	92.5
Oct.	80.4	3.6	2.6	7.5	97.5
Nov.	81.7	4.4	2.4	8.0	97.5
Dec.	80.5	4.0	2.7	7.8	95.0
Total	894.9	40.2	20.5	78.3	1,057.5
1956					
Jan.	78.5	4.0	3.1	8.8	97.5
Feb.	75.2	4.1	3.1	8.5	95.0
Mar.	78.3	4.1	3.1	8.8	97.5
Apr.	73.7	4.4	3.6	8.5	95.0
May	76.4	4.5	3.2	8.3	97.5
June	66.1	4.0	3.6	...	87.5

Source: Secretariat of the International Rubber Study Group; BDSA, United States Department of Commerce.
* Includes latices.
† Figures estimated or partly estimated.

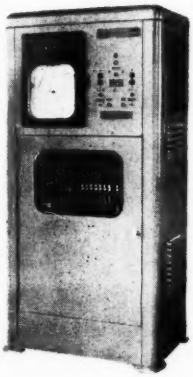
U.S.A. Synthetic Rubber Exports, by Country (Including Latices)

January-May, 1956
(Long Tons)

Country	SBR-Types	Butyl	Neoprene	N-Type	Total
U.K.	6,931	249	1,862	304	9,346
Belgium	1,301	87	1,388	63	2,839
France	5,644	1,066	397	357	7,464
Germany	5,401	1,249	1,114	287	8,051
Italy	2,818	103	641	270	3,832
Australia	4,363	150	134	31	4,678
Canada	3,184	2	1,300	127	4,613
Japan	1,253	324	887	422	2,886
Mexico	4,615	392	79	61	5,147
South Africa	3,420	183	154	17	3,774
All others	9,576	514	881	569	11,540
Total	48,506	4,319	8,837	2,508	64,170

Source: Secretariat of the International Rubber Study Group.

for PRODUCTION and LAB TESTING



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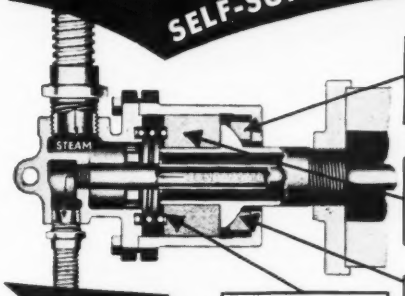
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	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
Passenger Car						
1953	33,106	45,798	809	79,713	81,455	13,044
1954	29,746	47,043	928	77,717	76,806	12,228
1955						
Jan.	3,481	4,139	79	7,699	7,797	12,363
Feb.	3,540	3,551	83	7,174	7,549	12,643
Mar.	4,326	4,255	104	8,685	8,810	12,874
Apr.	3,967	4,677	88	8,733	8,000	12,197
May	3,871	4,705	87	8,663	8,742	12,235
June	3,482	5,399	97	8,979	9,383	12,698
July	3,461	4,802	76	8,339	7,893	12,199
Aug.	2,984	5,058	60	8,103	7,585	11,636
Sept.	2,749	4,366	74	7,189	7,882	12,407
Oct.	3,172	3,556	74	6,802	8,160	13,806
Nov.	3,900	2,902	63	6,865	8,198	15,142
Dec.	3,641	2,746	81	6,467	7,223	15,963
Total	42,574	50,156	966	93,698	97,232	
1956						
Jan.	2,958	4,040	66	7,064	7,661	16,546
Feb.	2,919	3,387	90	6,396	7,571	17,701
Mar.	3,027	4,372	65	7,464	7,812	18,096
Apr.	2,787	4,994	67	7,847	7,530	17,649
May	2,349	5,203	65	7,617	7,628	17,714
June	2,162	5,659	64	7,885	6,600	16,443
July	2,471	5,482	73	8,026	5,669	14,088
Truck and Bus						
1953	4,843	9,326	734	14,904	14,696	2,676
1954	3,592	8,111	826	12,529	12,347	2,546
1955						
Jan.	303	827	81	1,211	1,243	2,586
Feb.	294	730	74	1,098	1,196	2,678
Mar.	454	672	96	1,222	1,273	2,734
Apr.	489	639	76	1,204	1,153	2,693
May	481	655	65	1,202	1,208	2,701
June	449	730	76	1,255	1,320	2,763
July	429	909	51	1,389	1,134	2,485
Aug.	378	922	59	1,359	1,132	2,272
Sept.	393	804	66	1,264	1,243	2,268
Oct.	324	904	88	1,315	1,395	2,357
Nov.	403	690	87	1,180	1,405	2,584
Dec.	404	552	91	1,047	1,255	2,815
Total	4,801	9,034	910	14,746	14,957	
1956						
Jan.	444	629	65	1,139	1,318	2,971
Feb.	424	565	88	1,077	1,326	3,232
Mar.	439	662	62	1,163	1,382	3,465
Apr.	430	767	74	1,271	1,303	3,483
May	421	777	65	1,264	1,358	3,582
June	372	968	65	1,404	1,329	3,504
July	362	837	73	1,272	1,073	3,306
Total Automotive						
1953	37,949	55,124	1,543	94,617	96,150	15,720
1954	33,338	55,154	1,754	90,246	89,153	14,774
1955						
Jan.	3,785	4,967	159	8,911	9,040	14,949
Feb.	3,833	4,281	157	8,272	8,745	15,321
Mar.	4,780	4,926	201	9,907	10,083	15,609
Apr.	4,457	5,315	165	9,937	9,153	14,890
May	4,352	5,361	152	9,865	9,949	14,936
June	3,931	6,129	174	10,234	10,703	15,460
July	3,890	5,711	128	9,729	9,027	14,684
Aug.	3,362	5,980	119	9,462	8,717	13,908
Sept.	3,142	5,171	140	8,453	9,125	14,675
Oct.	3,495	4,460	161	8,117	9,555	16,163
Nov.	4,303	3,592	150	8,045	9,603	17,727
Dec.	4,045	3,298	172	7,515	8,478	
Total	47,375	59,191	1,878	108,447	112,178	
1956						
Jan.	3,402	4,669	131	8,203	8,979	19,517
Feb.	3,343	3,953	178	7,473	8,897	20,934
Mar.	3,466	5,034	127	8,627	9,193	21,562
Apr.	3,217	5,761	141	9,119	8,834	21,132
May	2,770	5,980	130	8,880	8,987	21,296
June	2,533	6,627	129	9,289	7,930	19,947
July	2,833	6,319	146	9,298	6,741	17,394

Source: The Rubber Manufacturers Association, Inc.

U.S.A. Rubber Industry Employment, Wages, Hours

Year	Production Workers (1000's)	Average Weekly Earnings	Average Weekly Hours	Average Hourly Earnings	Consumers Price Index
		All Rubber Products			
1939	121	$27.84	39.9	$0.75	....
1954	195	78.21	39.7	1.97	114.8
1955					
Jan.	210.5	84.25	41.3	2.04	114.3
Feb.	210.4	84.25	41.3	2.04	114.3
Mar.	211.2	83.44	40.9	2.04	114.3
Apr.	211.6	86.11	41.8	2.06	114.2
May	214.4	86.94	41.8	2.08	114.2
June	220.0	88.83	42.3	2.10	114.4
July	216.9	86.52	41.2	2.10	114.7
Aug.	219.0	86.32	41.3	2.09	114.5
Sept.	223.1	86.74	41.5	2.09	114.9
Oct.	226.4	89.04	42.0	2.12	114.9
Nov.	231.2	92.01	42.4	2.17	115.0
Dec.	233.9	89.21	41.3	2.16	114.7
1956					
Jan.	232.5	87.91	40.7	2.16	114.6
Feb.	227.6	85.81	40.1	2.14	114.6
Mar.	224.7	84.93	39.5	2.15	114.7
Apr.	224.6	85.79	39.9	2.15	114.9
May	215.9	86.18	39.9	2.16	115.4
June	211.3	....	....	....	116.2
		Tires and Tubes			
1939	54.2	$33.36	35.0	$0.96	
1954	79.7	87.85	38.7	2.27	
1955					
Jan.	87.6	97.41	41.1	2.37	
Feb.	86.5	96.46	40.7	2.37	
Mar.	87.4	95.27	40.2	2.37	
Apr.	88.4	101.28	42.2	2.40	
May	90.1	100.91	41.7	2.42	
June	91.0	105.60	43.1	2.45	
July	91.5	103.82	42.7	2.42	
Aug.	91.0	102.72	42.1	2.44	
Sept.	91.9	101.02	41.4	2.44	
Oct.	92.3	103.74	42.0	2.47	
Nov.	94.2	106.26	42.0	2.53	
Dec.	94.7	99.50	39.8	2.50	
1956					
Jan.	94.1	101.00	40.4	2.50	
Feb.	93.7	97.71	39.4	2.48	
Mar.	93.3	97.89	39.0	2.51	
Apr.	91.8	98.00	39.2	2.50	
May	91.2	99.00	39.8	2.51	
		Rubber Footwear			
1939	14.8	$22.80	37.5	$0.61	
1954	20.7	67.43	39.9	1.69	
1955					
Jan.	22.1	68.97	40.1	1.72	
Feb.	21.5	69.72	40.3	1.73	
Mar.	21.4	69.72	40.3	1.73	
Apr.	21.2	70.99	40.8	1.74	
May	21.4	70.64	40.6	1.74	
June	21.6	71.34	41.0	1.74	
July	21.8	71.93	41.1	1.75	
Aug.	21.5	67.25	39.1	1.72	
Sept.	23.5	67.60	39.3	1.72	
Oct.	24.4	69.20	40.0	1.73	
Nov.	25.5	77.89	42.1	1.85	
Dec.	26.2	74.89	40.7	1.84	
1956					
Jan.	26.2	74.37	40.2	1.85	
Feb.	26.1	74.74	40.4	1.85	
Mar.	25.8	71.16	39.1	1.82	
Apr.	20.3	72.25	39.7	1.82	
May	20.0	72.25	39.7	1.82	
		Other Rubber Products			
1939	51.9	$23.34	38.9	$0.61	
1954	94.3	71.91	40.4	1.78	
1955					
Jan.	100.8	76.08	41.8	1.82	
Feb.	101.4	76.86	42.0	1.83	
Mar.	102.4	76.13	41.6	1.83	
Apr.	101.1	76.13	41.6	1.83	
May	105.0	78.31	42.1	1.86	
June	106.4	77.93	41.9	1.86	
July	103.6	73.84	39.7	1.86	
Aug.	104.3	75.85	41.0	1.85	
Sept.	107.7	78.96	42.0	1.88	
Oct.	109.7	80.56	42.4	1.90	
Nov.	111.5	83.03	42.8	1.94	
Dec.	113.0	83.69	42.7	1.96	
1956					
Jan.	112.2	79.73	41.1	1.94	
Feb.	107.8	77.95	40.6	1.92	
Mar.	105.6	76.99	40.1	1.92	
Apr.	106.6	77.95	40.6	1.92	
May	104.7	76.40	40.0	1.91	

Source: BLS, United States Department of Labor.

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ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

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Must have sales experience and good technical background in adhesives for rubber bonding. To travel in northeastern United States. Good opportunity with progressive, expanding company. Address Box No. 1986, care of RUBBER WORLD.

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Well-known manufacturers' agents serving rubber and paint trade with raw materials in Ohio area. Excellent facilities with liquid storage, drumming, and general warehousing. Additional capacity available. Address Box No. 1987, care of RUBBER WORLD.

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RUBBER COMPOUNDERS

Would you like to establish your residence in a medium-sized city in central Ohio that offers suburban-type living and yet be associated with a progressive organization that is one of the largest in its field? Unusual yes, but our well-equipped Engineering and Research Laboratory has a permanent position for a qualified person who has had 2 years' or more experience in rubber development and compounding. All replies confidential. Investigate today! Send résumé and salary requirements to Box No. 1988, care of RUBBER WORLD.

WANTED: ALL-AROUND MAN WITH OR WITHOUT FINANCES to go into the used rubber machinery business (used calenders, mills, general heavy rubber machinery). Must be fully qualified and can work hours to suit convenience. Prefer New England or New York man to come to office at least once a week. Address Box No. 1989, care of RUBBER WORLD.

ORGANIC CHEMIST

BS in organic chemistry or rubber technology, with 5 years experience in compounding and application of natural and synthetic elastomers, including silicone and polyurethane. Work will consist of laboratory evaluation of elastomers, product development, application engineering, and consultation with design engineers.

ANALYTICAL CHEMIST

BS in analytical chemistry and at least 5 years industrial experience. In addition to classic type of analysis, should be familiar with latest instrumentation used in analysis of inorganic materials, such as polarography and spectrophotometry. Will work with ferrous and nonferrous alloys, with an emphasis on light metal alloys such as aluminum, magnesium, and zinc.

•

Sandia Corporation, a subsidiary of Western Electric, is located in Albuquerque, New Mexico, and is engaged in nuclear weapons research and development for the Atomic Energy Commission.

Send resumé to:

Mr. BRIAN FINLEY

STAFF EMPLOYMENT SECTION 571

SANDIA CORPORATION

ALBUQUERQUE, NEW MEXICO

SITUATIONS OPEN (Continued)

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in
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Physical or Physical Organic Chemist

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Should have doctorate or the equivalent in industrial research and development. We'd like to hear from someone with at least five years in rubber research who has demonstrated independence and initiative.

This man will correlate these programs with manufacturing division which is enlarging and diversifying its product line.

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Address:
E. A. Gentry, Personnel Manager

CLEVITE RESEARCH CENTER
540 East 105th St.
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Manufacturer located in the Detroit area engaged in the production of industrial latex products requires the services of a competent factory superintendent. Excellent opportunity with growing organization. All fringe benefits. Salary commensurate with ability. Address Box No. 1990, care of RUBBER WORLD.

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Sales representatives who can produce business for efficient plant producing top-quality molded goods, extrusions, PVC linings, coatings and shapes. Several excellent territories open on commission basis. Address Box No. 1991, care of RUBBER WORLD.

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Manufacturer of magnet wire, aircraft wire, stranded lead-wire, plastic wire and harnesses, located in Mid-west, has excellent opportunity open for engineer experienced in part or all of those categories, to do liaison work with customers' engineers, cooperating with salesmen. Traveling on an unscheduled basis is required. This is a permanent position, with hospitalization, group insurance and pension plan, all company-paid. Salary open. Reply by letter giving full details of age, education, experience, qualifications. Replies will be held confidential—our employees know of this ad.

ADDRESS BOX NO. 1985, c o RUBBER WORLD

Production of Cotton, Rayon, and Nylon Tire Fabrics

(Thousands of Pounds)

	Cotton				Rayon				
	Tire Cord Not Woven	Tire Cord Fabric Woven	Chafer and All Other Tire Fabrics	Total	Tire Cord Not Woven	Tire Cord and Other Tire Fabrics	Total	Nylon Tire Cord and Fabrics	Total* Synthetic Tire Cord and Fabrics
1954									
Jan.-Mar.	‡	2,585	13,229	15,814	17,297	73,068	90,365	5,320	95,685
Apr.-June	‡	4,067	12,830	16,897	12,436	66,796	79,232	8,357	87,589
July-Sept.	‡	2,104	9,321	11,425	12,851	50,136	62,987	6,754	69,741
Oct.-Dec.	‡	3,743	12,476	16,219	14,609	76,931	91,540	9,338	100,878
Total	‡	12,499	47,856	60,335	57,193	266,931	324,124	29,769	353,893

	Cotton and Nylon[a]		Rayon Tire Cord		
	Cotton Chafer Fabrics and Other Tire Fabrics	Cotton and Nylon Tire Cord and Fabric	Woven	Not Woven	Total All Tire Cord and Fabrics
1955					
Jan.-Mar.	12,763	14,870	79,191	20,299	127,123
Apr.-June	12,728	18,527	80,908	21,550	133,713
July-Sept.	12,941	16,093	81,996	20,740	131,770
Oct.-Dec.	12,333	15,754	77,600	24,343	130,030
Total	50,765	65,244	319,695	86,932	522,636
1956					
Jan.-Mar.	12,815	16,483	74,833	23,707	127,838
Apr.-June	10,511	18,241	60,644	21,557	110,953

* Fuel cell fabrics not included with rayon and nylon tire cord and fabrics.
† Included with "Chafer and All Other Tire Fabrics" to avoid disclosing data for individual mills.
‡ Included with "Tire Cord Fabric Woven" to avoid disclosing data for individual mills.
[a] Cotton and nylon figures combined to avoid disclosing data for individual companies.
Source: Bureau of the Census, United States Department of Commerce.

Carbon Black Statistics—First Seven Months, 1956

Furnace blacks are classified as follows: SRF, Semi-reinforcing furnace black; HMF, high modulus furnace black; FEF, fast-extruding furnace black; HAF, high abrasion furnace black; SAF, semi-abrasion furnace black.

(Thousands of Pounds)

	Jan.	Feb.	Mar.	Apr.	May	June	July
Production							
Furnace types							
Thermal	11,874	11,478	12,127	10,665	11,712	11,483	11,577
SRF	34,047	30,367	31,692	28,711	31,622	29,081	30,860
HMF	10,401	8,681	7,984	8,764	8,972	8,066	7,479
FEF	20,776	19,518	21,359	19,948	18,339	20,118	17,890
HAF	36,802	36,807	38,058	33,832	38,830	37,542	38,334
SAF, ISAF	13,918	13,555	16,228	20,145	17,149	16,172	14,250
Total furnace	127,818	120,406	127,448	122,065	126,624	122,462	120,390
Contact types	32,222	28,717	31,552	30,460	30,613	29,011	30,120
Totals	160,040	149,123	159,000	152,525	157,237	151,473	150,510
Shipments							
Furnace types							
Thermal	11,846	11,361	11,204	10,242	10,376	8,327	8,326
SRF	32,165	26,973	27,492	25,239	26,646	19,893	20,242
HMF	9,453	8,420	9,051	9,184	8,068	8,483	7,519
FEF	19,381	16,379	17,559	18,369	17,413	15,054	14,311
HAF	36,934	35,142	36,374	31,287	37,319	32,698	33,799
SAF, ISAF	14,500	14,762	15,637	15,015	14,517	13,055	13,610
Total furnace	124,279	113,037	117,317	109,336	114,339	97,510	97,807
Contact types	33,256	31,548	30,377	31,032	31,582	29,609	28,661
Totals	157,535	144,585	147,694	140,368	145,921	127,119	126,468
Producers' Stocks, End of Period							
Furnace types							
Thermal	6,013	6,130	7,053	7,476	8,812	11,968	15,219
SRF	21,021	24,415	28,615	32,087	37,063	46,251	56,869
HMF	21,304	21,565	20,498	20,078	20,982	20,565	20,525
FEF	24,957	28,096	31,896	33,475	34,401	39,465	43,044
HAF	36,323	37,988	39,672	42,217	43,728	48,572	53,107
SAF, ISAF	26,669	25,462	26,053	31,133	33,815	36,932	37,572
Total furnace	136,287	143,656	153,787	166,516	178,801	203,753	226,336
Contact types	95,294	92,463	93,638	93,066	92,097	91,499	92,958
Totals	231,581	236,119	247,425	259,582	270,898	295,252	319,294
Exports							
Furnace types	21,806	24,725	24,105	17,295	19,647	22,922	.....
Contact types	11,886	15,097	12,607	14,957	12,189	14,662	.....
Totals	33,692	39,822	36,712	32,252	31,836	37,584	.....

Source: Bureau of Mines, United States Department of the Interior, Washington, D. C.

SITUATIONS OPEN (Continued)

RUBBER CHEMIST, CHEMICAL ENGINEER, OR CHEMIST
Outstanding medium-sized mechanical goods company Central New Jersey. Our employes know of opening. Compounding-development-research. Address Box No. 1992, care of RUBBER WORLD.

RUBBER TECHNOLOGIST
wanted for development laboratory in northern New Jersey. Degree in chemistry or chemical engineering. At least three years' experience in rubber compounding and development. Medium-sized company in expanding operation. Salary $500 to $650 a month depending upon experience and training. Address Box No. 1996, care of RUBBER WORLD.

SALES REPRESENTATIVE—EXPERIENCED IN MECHANICAL rubber products who can produce business for a nationally-prominent manufacturer desiring diversification. Excellent opportunity for a man with contacts and ability to be in on the ground floor of an expansion program. Metropolitan New York City location. Address Box No. 1997, care of RUBBER WORLD.

RUBBER CHEMIST
with at least 3 years' experience in compound and process development of rubber and synthetic stocks. Experience in industrial-type products preferred. Write giving résumé and salary expected. GOODYEAR TIRE & RUBBER COMPANY, Box 1833, Lincoln, Nebraska.

RUBBER CHEMIST—COMPOUNDER WANTED

Should have 3 to 8 years' experience, preferably in mechanical goods compounding and rubber-to-metal adhesion.

Write giving experience, education, salary requirements

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For development work and to assist in production.

The man we desire must be experienced in his own field.

Give complete résumé in first letter and salary expected. All replies will be held in strict confidence.

Address Box No. 1983, c/o RUBBER WORLD

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Twelve Months' Index to Volumes 133-134, October, 1955—September, 1956

RUBBER WORLD

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386 Fourth Avenue, New York 16, N. Y.

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Statement of RUBBER WORLD

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2. The owner is: Bill Brothers Publishing Corp., Raymond Bill, Estate of Edward Lyman Bill, all at 386 Fourth Ave., New York 16, N. Y.

3. The known bondholders, mortgagees, and other security holders owning or holding 1% or more of total amount of bonds, mortgages, or other securities are: None.

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B. BRITTAIN WILSON
Publisher, Business Manager

Sworn to and subscribed before me this 11th day of September, 1956.

[Seal] HELEN M. VERLIN

Notary Public in the State of New York. No. 31-9460500. Qualified in New York County.

(Commission expires March 30, 1958)

CALENDAR OF COMING EVENTS

October 22-26
National Safety Council. Forty-Fourth National Safety Congress and Exposition. Chicago, Ill.
(Rubber Section, October 22-23.)

October 26
Philadelphia Rubber Group. Poor Richard Club, Philadelphia, Pa.

Akron Rubber Group. Fall Meeting. Plasticizers Symposium, Sheraton-Mayflower Hotel, Akron, O.

October 30
Buffalo Rubber Group.

November 2
Chicago Rubber Group. Furniture Mart, Chicago, Ill.

November 7-9
Society of Rheology. Annual Meeting. Mellon Institute, Pittsburgh, Pa.

November 8
Rhode Island Rubber Club. Fall Meeting. Pawtucket Country Club.

November 8-9
National Research Council of Canada and Chemical Institute of Canada. Seventh Canadian High Polymer Forum. Guildwood Inn., Pt. Edward, Ont., Canada.

November 16
Connecticut Rubber Group.

November 16-17
Southern Rubber Group. Formation Plans. Jung Hotel, New Orleans, La.

November 25-30
American Society of Mechanical Engineers. Annual Meeting. Hotel Statler, New York, N. Y.
(Rubber & Plastics Division, November 29.)

November 26-30
Twenty-Second National Exposition of Power & Mechanical Engineering. Coliseum, New York, N. Y.

November 27-30
Cleveland and Chicago Sections, ACS. Ninth National Chemical Exposition. Public Auditorium, Cleveland, O.

November 28-30
International Ozone Conference. Sheraton Hotel, Chicago, Ill.

December 4-6
Wire & Cable Symposium. Berkeley-Carteret Hotel, Asbury Park, N. J.

December 5
Buffalo Rubber Group. Christmas Party.

December 14
New York Rubber Group. Christmas Party. Henry Hudson Hotel, New York, N. Y.

Boston Rubber Group. Christmas Party. Hotel Somerset, Boston, Mass.

December 21
Chicago Rubber Group. Christmas Party. Morrison Hotel, Chicago, Ill.

1957

January 16-18
Society of Plastics Engineers, Inc. Thirteenth Annual National Technical Conference. Hotel Sheraton-Jefferson, St. Louis, Mo.

January 25
Akron Rubber Group. Winter Meeting.

January 28-31
Plant Maintenance & Engineering Show and Conference. Public Auditorium, Cleveland, O.

February 5
The Los Angeles Rubber Group, Inc. Hotel Statler, Los Angeles, Calif.

February 15
Chicago Rubber Group. Furniture Mart, Chicago, Ill.

March 5
The Los Angeles Rubber Group, Inc. Hotel Statler, Los Angeles, Calif.

March 15
Chicago Rubber Group. Furniture Mart, Chicago, Ill.

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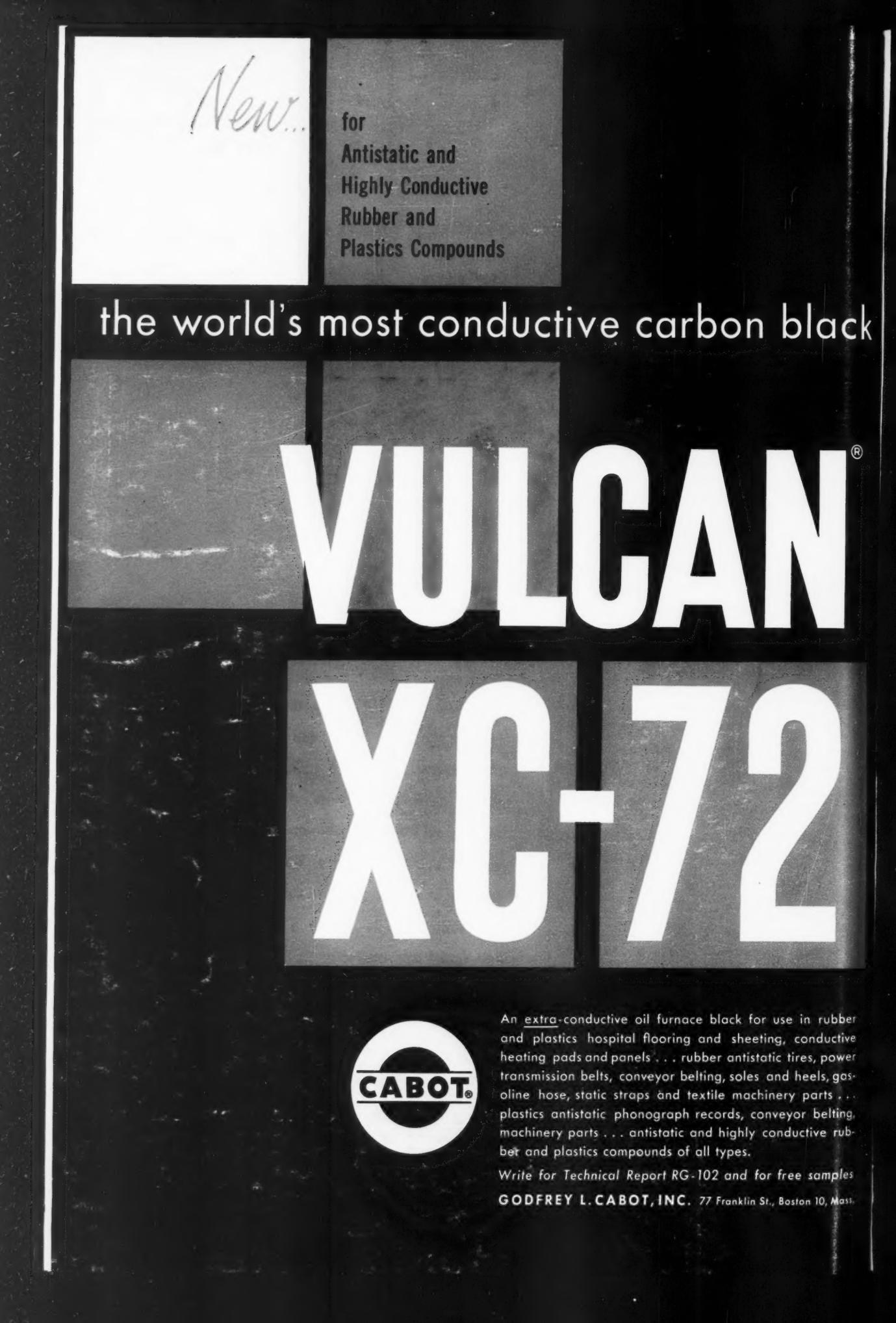
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